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THE INVENTORS' INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE.

Chairman of the Council—**SIR ANTONIO BRADY.**

THE various efforts which have been made, and the numerous influences now at work to injure, if not to destroy, Patent Rights; the inefficiency of the many well intended, but ill considered, schemes of Patent Law Reform which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor, without advantage to the Public; together with the proceedings so essentially involving the interests of inventors which have already taken place in Parliament, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organizing the influence of Inventors, Patentees and others. Its objects are:—

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2nd To promote improvements in the Patent Laws.

3rd. To facilitate the diffusion of information with reference to Inventions and other subjects beneficial to Inventors and Patentees.

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APPLICATIONS FOR LETTERS PATENT.

*** In this list (Com.) means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur-street, Charing Cross.

On January 7th.—76 to 97.—J. C. Johnson. Twist lace machines.—J. Fottrell. Artificial stone pipes and tubes, and coating or lining thereof, to render them suitable for the conduit of alkaline liquids and acid products from chemical, manure, and gas works, for sewage, saline liquids, and gas.—J. Mansley. Compound engine for the working of all kinds of machinery.—G. Bramwell. Production of agents for giving or restoring colour to or improving the appearance of the human hair.—W. R. Lake. Adjustable or fast and loose pulley (com.)—H. C. de Vogt. Apparatus for navigating the air.—F. W. Fox. Apparatus for combing wool or other fibrous substances.—S. Bramall. Double-acting and continuous brake for railway carriages and waggons.—W. H. Brookes. Pumps.—J. Marshall. Thrashing machines.—T. Cain. Hollow bars for furnaces or fire-grates.—J. F. Corkran. Improved manure (com.)—D. Davies. Steam boilers.—A. B. Cruickshank. Cleats for holding the sheets in sailing boats.—W. H. Barlow, jun. Pens.—W. E. Gedge. Construction of windows for ventilating cars, dwellings, steamboats, and other like places, and in attachments thereto (com.) (Complete specification).—C. E. Blake. Improvements in dentistry. (Complete specification).—J. Webster. Mounting and working converters employed in the manufacture of steel and other metals.—W. E. Newton. Electro-magnets and application of the same for obtaining motive-power (com.)—W. Andrews. Sewing machines.—G. Haseltine. Machine for testing and registering or recording the strength, elasticity, and ductility of wood, iron, and other materials (com.) (Complete specification).—H. H. Murdoch. Obtaining potash from the "yolk" of wool and from the residuum of the distillation of beet-root juice or of molasses (com.)

On January 8th.—98 to 118.—A. Miller. Rendering, purifying, and bleaching tallow, lard, and other fatty matter (com.)—T. Mason. Lead or type-metal stereotype block for mounting and fastening stereotype blocks and other similar plates on.—A. Ray. Process for obtaining in virtual effects or motions the animation of drawn figures by the help of two images combined in order to represent the two extreme positions of a motion, appearing and disappearing in turn before the eyes (com.)—W. F. Reynolds. Ships' compasses and means for regulating and adjusting the same and other compasses thereby.—J. F. P. Woodley. Machinery employed in the manufacture of wood casks.—D. Williams. Anchors.—D. Davies. Regulating the speed of

BRITISH MUSEUM

steam engines.—J. Atkinson. Cap or head-dress for travelling or resting the head.—R. Newton. Fire bars.—W. E. Gedge. Embroidering machine known as the "Bounaz Couso-Brodeur" by the application of a braiding apparatus (com.)—W. J. Vernon. Closing or stoppering of aerated liquid bottles having internal stoppers.—H. Negretti and J. W. Zambra. Thermometers used in deep sea soundings.—H. A. Bonneville. Coal small waggons (com.)—J. L. Clark and J. Standfield. Floating docks and pontoons.—J. F. C. Farquhar. Gas burners.—J. Lazenby. Umbrellas, parasols, and sunshades.—J. Holden and J. E. Holden. Machines for washing wool.—W. Cox. Sacks or bags.—J. Robertson. Indicating and registering the number of persons who enter and leave tramway cars, omnibuses, public halls, steamboats, or other places of public resort.—W. Lighbody. Lamps.—W. Marshall and T. A. Crosskill. Wringing and mangling machines.

On January 9th.—119 to 132.—J. B. Hamilton. Musical instruments. (Complete specification).—G. S. Fleming. Apparatus applicable to candles when burning.—M. Benson. Pump valves (com.) (Complete specification).—G. W. Dyson. Apparatus for rolling metals and other bodies or substances.—G. H. C. Hedley. Improved fire-lighter.—E. T. Truman. Manufacture of insulated telegraphic conductors, and machinery for their manufacture.—W. Pindar and A. G. Pindar. "Silk" machines for dressing flour, part of such improvements being applicable for sieving or sifting other powdered or pulverised material.—H. Pooley, jun., and J. Greenwood. Weighing machines.—W. Macnab. Steam boilers.—J. Woodward. Manufacture of blocks or slabs for paving.—T. S. Bennett. Pickers.—W. E. Gedge. Steam generator applicable to stationary engines (com.)—J. M. Napier. Bottle labels.—R. S. Norris. Apparatus for cutting or getting coal and other substances in mines or quarries.

On January 10th.—133 to 148.—F. J. Drechsler. Winnowing machines.—G. Walker. Curtain hooks and clips for suspending or securing hangings, garments hats, and various other articles. J. D. Derry. Holders for lamps and candles.—J. Radford. Safety valves.—M. Billings and G. K. Billings. Steam generators.—P. Jensen. Modes of and means and materials for the manufacture of vats, gas-holders, and other vessels (com.)—J. Brennan. Apparatus adapted for facilitating the teaching of arithmetic in schools.—E. Wright. Sewing and other treadle machines (Complete specification).—C. W. Corpe. Construction of concrete buildings.—J. H. Cohrs. Railway couplings.—J. Foster and W. Whitaker. Apparatus for cleaning and smoothing the "dents" of reeds of looms for weaving.—C. Avery. Teeth gearing and lubricating bearings applicable to horse-power engines and other purposes.—J. Sikes, T. S. Bateman, and J. Mellard. Machinery for rolling metals.—E. Lord. Apparatus for drying yarn in the processes of sizing, dressing, bleaching, and dyeing.—A. A. Deiss. Extraction of quinine from bark.—C. M. Talcott. Manufacture of screws (com.)

On January 12th.—149 to 163.—G. K. and G. Seydeler. Measuring the distances run over by wheeled vehicles.—D. McMillan. Appliances for cleaning the driving surfaces of machinery belts.—J. S. Crossland. Economising fuel and consuming smoke in stationary, marine, or locomotive steam boiler and other furnaces.—C. Mohr. Riveting the joints and seams of deed and other boxes, travelling trunks, coal vases, and similar articles.—W. Foulis. Apparatus for charging retorts.—J. S. Cockings. Snap or portable connectors for harness and other useful purposes where a metallic portable connector may be required (com.)—J. Shaw and J. Shaw. Hydraulic hoisting apparatus.—J. C. Mewburn. Textile fabric (com.)—E. T. Hughes. Safety apparatus applicable to cages used in the shafts of mines and hoists (com.)—T. Ward. Railway brakes.—W. Russell. Apparatus for the manufacture of Ayrshire bonnets.—A. E. Schmersahl. Treating sewage water and other foul liquids.—J. G. N. Alleyne, Bart. Apparatus for puddling iron.—J. Loewensohn. Safety screws for every kind of packing.—H. Deacon. Treatment of impregnated porous substances employed for effecting chemical decomposition of certain gases at an elevated temperature.

On January 13th.—164 to 179.—G. Eyre. Convertible school desks and seats.—R. S. Newall and H. Bowman. Method of condensing muriatic acid gas and other fumes.—P. Wilson. Double-drill plough.—G. E. Hearson. Argand burners.—C. D. Abel. Electric tell-tales for pressure gauges (com.)—J. Norman. Apparatus for clipping horses and other animals.—S. Turnbull. Horseshoes.—A. R. Donisthorpe, G. E. Donisthorpe, G. White, and J. Toon. Manufacture of yarns from wool and such like fibrous substances.—J. E. Ellis and E. Redgate. Machinery for treating hides and skins.—W. Black and D. Hill. Manufacture of soda in revolving furnaces.—J. Lake. Apparatus for regulating the draught in the internal flues of steam generators.—W. Beverley. Life buoys.—J. Scaife. Material for use as packing for the piston rods of steam engines, pumps, and like uses, and method for packing the same.—J. Bullough. Machinery or apparatus for sizing and drying yarn.—J. Howard and E. T. Bousfield. Steam cultivating machinery.—F. J. Bird. Manufacture of mordant applicable to the dyeing of cotton and union goods.

On January 14th.—180 to 191.—J. W. Lewis and G. Wood. Stoves or ranges for heating, drying, cooking and baking.—E. Cole. Crushing and reducing to impalpable powder baryta, cocoa, refined sugar, and similar substances, both vegetable and mineral.—D. Imhoff. Automatic musical instruments.—W. J. Burgess and C. T. Burgess. Reaping and mowing machines.—C. D. Abel. Dressing and finishing woollen cloths and other like fabrics, and apparatus therefor (com.) (Complete specification). A. Pourchè. Destruction of insects by the aid of steam alone or mixed with chemical vapours to be applied to agriculture.—D. Eastwood. Looms for weaving.—W. Kirk. Machinery or apparatus to be employed in the manufacture of "tips" for shuttles for weaving.—J. H. Smith. Self-acting mules.—C. Heaton. Emery or other grinding machines, parts of which are also applicable to other machinery.—F. Sival. Manufacture of lace.—E. Nugent. Machinery for the manufacture of screws and screw nails. (Complete specification).

On January 15th.—192 to 205.—D. Stewart. Constructions of clips or holders and their chains for cloth-stretching and finishing machines.—R. Smith, G. W. Stephenson, and J. Vere. Treble-purchase capstan for fishing and other vessels.—E. Jones. Metallic cartridge cases. W. E. Teale. Lamps.—T. Moison. Machines for drying tissues, felts, threads, and textile materials, and for destroying at the same time, if necessary, any vegetable matter which may be contained in the fibrous animal material.—H. Yates. Ornamentation of lace and other textile fabrics.—T. Taylor. Apparatus for grinding or surfacing metal.—H. V. Dyk. Dressing and travelling bags, stationery and other similar cases.—G. Archbold. Treatment of substances containing alumina, so as to render them more suitable for the production of aluminous compounds.—C. Wood. Granulating machines.—J. L. Clark and J. Standfield. Floating docks and pontoons.—W. D. Hooker. Direct-acting steam engines, also including pumps, said engine being applicable for driving pumps, steam hammers, and other machinery, in which a direct action is required. (Complete specification).—J. Clark. Waterproof garments, and the production of materials from which such garments are made.—A. V. Newton. Apparatus for filtering, rectifying, or clarifying liquids and gases (com).

On January 16th.—206 to 220—C. J. Ball. Drills for boring holes.—P. Huerne. Self-cleaning water filter, &c.—A. M. Clark. Lamp-black (com.).—C. de Fever. Machine for sewing and planting.—J. Atkins. Ornamental metallic tubing. F. H. Smith, M.D. Tape plaisters or bandages, and mounting same upon reels or holders.—W. R. Lake. Peat fuel (com.)—C. Belier. Mats (com.)—J. H. Johnson. Combustible compositions, and their mode of application for signalling and illuminating purposes (com.)—J. H. Johnson. Machinery for making wooden rollers employed for spinning, &c.—J. S. C. Heywood. Compositions to be applied to the surfaces of ships and to other surfaces for the purpose of protecting them, and treatment of such.—G. Lowry. Governors for steam and other motive-power engines.—F. Sival. Ornamental fabrics made on lace machines.—J. T. Griffin. Wrenches for turning pipes, bars, &c. (com.)—A. Brown. Converting cast iron, wrought iron scraps, old rails, &c., into steel or metal having the properties of steel (com).

On January 17th.—221 to 233.—F. Lebacq. Horse-shoes to prevent accidents.—J. Whalley. Hulling or decorticating, winnowing, cleaning, polishing, and assorting rice.—W. E. Lea. Hydraulic motive-power engines.—G. Smith. Bichromate of potash.—L. J. Todd. Tramway locomotives and boilers.—J. Lamont. Water-closets and service cisterns.—A. Abrahams. Mode of producing the evaporation of perfumery and other fluids.—E. Butterworth. Machinery for preparing, spinning, doubling, winding, and reeling cotton, and other fibrous substances.—W. Hartmann and G. H. J. Hartmann. Apparatus for locking and unlocking railway carriage doors.—S. T. Dutton. Railway facing points, and working and securing same.—Rev. G. H. Forbes. Purification of gas and manufacture of artificial fuel.—Rev. G. H. Forbes. Purification of gas.—W. R. Lake. Ventilating and warming apparatus (com.)

On January 19th.—234 to 249.—J. Macintosh. Cigarettes.—T. T. Blair. Composition or coating bottoms of ships and submerged structures.—T. Robinson. Caustic soda boiler or concentrator.—C. A. Lippincott. Manufacture of condensed milk (com.)—J. Mathieson. Mode of protecting torpedoes from premature explosion.—J. Broadfoot. Pumps.—M. Macmillan, sen. Finishing or treating woven fabrics.—J. Miller. Treating animal size for the obtainment of glue and other products.—W. E. Gedge. Gas burners with lateral and covered jets (com.)—J. Siddall and F. Gutteridge. Oil lamps.—W. Whiteley and G. Harling. Looms for weaving.—R. Van de Weerd. Apparatus for producing motive power, and for driving mechanism.—E. P. H. Vaughan. Generating inflammable gas by the carburization of atmospheric air (com.)—J. H. Johnson. Shoe tips (com.) (Complete specification.)—W. Easton and F. Tattersall. Machinery for moulding bricks and other blocks.—G. C. Pattison. Fog signals and alarm bells to be used on a vessel or at lighthouses, shoals, or other places.

On January 20th.—250 to 255.—J. H. Smith. Sewing machines.—A. Abrahams. Gas and other lamps.—G. Lewis and A. Lewis. Trucks or barrows, more especially intended for carrying, elevating, emptying, and filling sacks, loading them into waggons or carts or other vehicles, and other like operations.—A. M. Clark. Electric telegraph apparatus, and alphabetical symbols for use in transmitting telegraphic messages (com.)—M. H. Synge. Apparatus for deodorizing and discharging fluids, and for trapping sinks, drainpipes, and tanks.—M. H. Synge. Apparatus for filtering and purifying the drainage of houses and streets.

On January 21st.—256 to 266.—J. B. Stearns. Electric telegraph apparatus (partly com.)—T. Fox. Spring mattrass.—J. F. Harvey. Umbrellas, parasols, and sunshades.—E. C. Kinder and J. T. Kinder. Construction of combined cabinet and automaton smoking or fumigating apparatus.—J. Strachan. Cheques and similar documents for banking and other purposes.—W. R. Lake. Lamps (com.)—J. E. T. Woods. Steam and other boilers.—H. Lomax and G. F. Bradbury. Sewing machines.—A. Maw Metal moulds or dies used in the manufacture of earthenware or china from clay in the powdered state by means of compression.—E. H. C. Monckton. Magnetic engines.—B. C. Molloy and D. G. Fitzgerald. White lead.

On January 22nd.—267 to 283.—J. Morrill. Pinch bars for removing railway waggons, carriages, &c.—H. Greener. Glass letters and figures.—A. Ford. Cleansing cotton waste.—W. T. Whiteman. Signalling on railways.—T. Griffin. Coupling for driving belts.—C. Worssam. Motive-power machine.—P. Jensen. Wood-working machinery (com.)—J. B. Marlow, J. Roebuck, and J. T. Fallows. Railway points.—W. Thompson. Cutting, dressing, and moulding marble, stone, and slate.—N. Thompson. Stoppers or covers for bottles, jars, &c.—A. Tylor and J. J. Tylor. Apparatus for containing, measuring, controlling, regulating, and arresting the supply of liquids and fluids, and preventing waste.—W. R. Lake. Sheet-metal rails, cotton cans, and other like vessels (com.)—J. Hickisson. Stopping or stoppering bottles, jars, &c.—S. C. Lister. Combustion in fuel.—F. Grubinski. Mowing machine.—G. Stacy. Hammer.—Major-Gen. H. Y. D. Scott and J. B. Spence. Treatment of sewage and ammoniacal liquids.

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Scientific and Literary Review,

AND RECORD OF PROGRESS IN
ARTS, INDUSTRY, AND MANUFACTURES,
INCORPORATING THE
JOURNAL OF THE INVENTORS' INSTITUTE.

MAY 1, 1874.

PREVENTION OF ADULTERATION.

No. II.

It is curious to note the various decisions given by the magistrates. A case brought before Mr. Partridge in October last, in which a mustard admixture was sold bearing a label, "This is an admixture in which no injurious ingredient has been used. 35 and 36 Vict., c. 74, s. 3," was held by him to be sufficient, and he accordingly dismissed the summons. This appears to us, as far as possible to meet the requirements of the Act, but similar cases have occurred where the sellers have been fined. A summons heard before Mr. D'Eyncourt was dismissed, as he observed, that "the adulteration was sanctioned by long custom." A more important case came before the Southwark Police Court, in which the seller pleaded guilty. Mr. Benson, however, observed that it was "difficult to get at the parties who were morally guilty, and instructed that proceedings should be taken against the manufacturers." The case was, however, afterwards disposed of by the seller being fined twenty shillings. Many more cases might be mentioned presenting anomalous decisions. That the Act must be amended is certain, for neither manufacturers nor retail dealers will submit to such a gross injustice to trade.

Tea is an article largely adulterated in China, and has recently occasioned several prosecutions, yet the Act has no clause to protect the innocent tradesmen and punish the real culprits. Surely this is a great defect in legislation—the more so, when we consider that tea duty is an important item in the revenue. Perhaps the Grocers' Company of London could do something herein.

The desire of the majority of the analysts who are enforcing the Act, is, that no admixture shall be allowed. But the result of the various trade meetings, is a petition in which is embodied a desire that the names of all ingredients shall be clearly printed on all articles sold, when admitted to be admixtures. A more stringent course might, however, be adopted, which would be that the *percentage* of mustard, flour, or cocoa should be stated on all admixtures in the following manner:—"This article contains seventy per cent. of mustard," flour, or cocoa as the case may be. The purchaser would then be in a position to judge of the value of the article sold. Though we question whether the exigences of petty retail trade, and the circumstances of large numbers of people allow of excessive rigidity being exercised in these matters. Food must be had in sufficient quantity; and a very little of the very best will not suffice to meet the wants of the many; and to say that people can mix the inferior ingredients for themselves, is just indulging in that unpractical kind of talk which our kid-gloved philanthropists find so convincing to themselves when laying down plans for regulating the transactions of people in different spheres of life to that in which they move. Moreover, a prevention system rigorously applied would militate against the introduction of inventions for new food compounds, seeing that, as we have already intimated, innocuous, even beneficial, admixing is a finable offence.

But to return to mustard: the innumerable names given to the various qualities of mustard which we have tested must often delude the public, and give an opportunity to an unscrupulous tradesman to palm off a lower quality of mustard for that of the best qualities called genuine, and double superfine. If manufacturers could only see this, and issue but three, or perhaps, two qualities of mustard, we are convinced it would be greatly to their advantage.

The firm of Messrs. Keen, Robinson, Bellville and Co., whose manufactory is the oldest and largest in the City of London, exports tons to America and the Colonies, besides which, it finds a large consumption at home; and without attempting to disparage the productions of other manufacturers, we can confidentially say that no better article can be obtained than those issued by that firm in square cans.

A calm consideration of the actual position of affairs convinces us that the suppression of adulteration should not be ridden too hard, for we cannot, with any certainty, deal with first offences unless of a gross and unmistakeable character, upon analysis only, since, if cases are well fought, we may often have similar results to what occurred not long ago with regard to bread, when two chemists of the highest eminence, and as we from well grounded knowledge of them, would affirm of the highest talent and integrity, Dr. T. Redword and Dr. Hardwicke, were opposed by another chemist of eminence, Mr. Wanklyn, in such form and manner that the whole proceedings served only to point the moral "when doctors disagree who shall decide;" and to force upon us this self-evident preposition that a matter which produces diametrically opposite opinions from men of scientific eminence cannot be dealt with as a matter of certainty by our magistrates. Surely to mulct an ignorant petty trader, when not the producer, for dealing in articles which first-rate scientific men do not concur in asserting to be adulterated, must, if we have nothing beyond analysis to guide, be absurdly cruel.

The truth is we have set about the task of suppressing adulteration without having secured a sufficiently certain basis for our operations, and well devised machinery for giving effect to them. To start with such a theory as that upon which the present adulteration Act proceeds, namely, no admixture of any kind, may be simple enough. We consider it simple in more senses than one; and if the law is to maintain the character of being just, equal, and reasonable, this Act must be carefully reconsidered after due consultation with commercial men, and men of science. And convictions under the Act must not be left to the mere *ipse dixit* of a magistrate, prompted by analysts whose business is held to be to secure convictions, as would appear to be the case, as anyone will perceive who carefully notes what is from time to time stated in the public prints with regard to these analysists; some of whom are said not to do enough in the way of procuring the punishment of adulterators—a pretty clear hint that they are mere advocates on the side of prosecution.

One thing appears to us almost indispensable in order to secure the satisfactory working of the Act, and that is, the magistrate should be assisted by a scientific assessor, with whom he should advise on the scientific aspect of the case presented for adjudication; such assessor to be open to be objected to by either side, in order, if possible, to secure that impartial and reliable men only be placed in that position.

Reviews.

STUDY OF ORGANIC CHEMISTRY.

"Introduction to the Study of Organic Chemistry.—The Chemistry of Carbon and its Compounds." By HENRY E. ARMSTRONG, Ph.D., F.C.S., Professor of Chemistry in the London Institution. London: Longman, Green, and Co., 1874.

THE present work is another of that admirable series of text-books, published by Messrs. Longman, which we have before had occasion to speak of in terms of approval, and this one is certainly one of the best works of its kind. The author, so far as the limit of the book will allow, has gone into his subject with great exactness. Thus, the first part of the work deals with the method employed in ascertaining the composition of carbon compounds, and representation of such compounds by empirical formula, and by formula which not only express their composition, but also to a certain extent picture their nature. After a short description of the action of various reagents on carbon compounds, the compounds of carbon with oxygen, with sulphur and with nitrogen, are considered; and next is described the great family of hydro-carbons, and then the remaining compounds of carbon are considered in the order of their relation to the hydro-carbons, which are regarded as forming the parent series.

We cordially recommend this work to all searchers after scientific knowledge, and we have no doubt that benefit will be reaped by its careful study.

PRINCIPLES OF SCIENCE.

"The Principles of Science: A Treatise on Logic and Scientific Method." By W. STANLEY JEVONS, M.A. London: Macmillan and Co.

THIS is a work that ought to be studied by all who are not content with a superficial view of science, or of life around us. It aims, according to the author, at direct opposition to the philosophy of Auguste Comte, supplanting it by one that, as he says, will not deny the existence of things because they cannot be weighed and measured. It will rather lead us to believe that the wonders and subtleties of possible existence surpass all that our mental powers allow us clearly to perceive. The study of logical and mathematical forms has seemed to convince him that even space itself is no requisite condition of conceivable existence. Doubtless many persons will not agree with this philosophy; but as the way in which Professor Jevons handles the subject is both able and ingenious, it will therefore be read with interest by all who are inclined to the study of speculative philosophy.

STEEP GRADIENTS ON RAILWAYS.

"A Treatise on an Improved Method for Overcoming Steep Gradients on Railways, whereby any ordinary locomotive, capable of hauling a given load up a gradient of 1 in 80, can take the same up 1 in 8." By HENRY HANDYSIDE, late Assistant Provincial Engineer to the Government of Nelson, New Zealand. London: E and F. N. Spon, 48, Charing-cross. New York: 446, Broome-street. 1874.

THIS pamphlet in an able manner treats of a subject now one of the most important of the present day. Whilst dealing with the question generally, the author introduces his own plans in the following terms:—

The general details of the new system may be understood from the following description, and relate principally to one arrangement of parts, to be applied to almost any ordinary construction of locomotive and railway carriage or waggon, whereby the safe and easy ascent of trains up steep gradients is accomplished, and their passage round sharp curves is facilitated.

According to the new system the locomotive engine is coupled to the train by a steel chain, which is wound round a drum mounted in the framing of the engine.

The axis or shaft of this drum works horizontally in bearings fixed in the main framing of the engine, and is rotated, direct or with more advantage by gearing, from a separate pair of cylinders, distinct from the usual cylinders which drive the locomotive.

The drum need not exceed 2 feet in width, and its barrel 1 foot in diameter, with an outside diameter for the cheeks of 3 feet: this size will accommodate an ample length of steel chain to fulfil all the requirements of the system.

The chain to be of about ¾ inch diameter, round steel, slightly tempered, and the required length need not exceed half a ton.

On each side of the engine framing, and also on each side of one or more carriages or waggons of the train, there are suspended one or more self-acting gripping struts, which, when let down on the rails by the driver or other person in charge of the train, will firmly grip the sides of the rails and hold the engine or train stationary.

The gripping portion of these struts are made of steel, having their inner surfaces hardened and roughened, so that the possibility of slipping is entirely obviated, and as the *sides* of the rails are thus being grasped by roughened surfaces of hardened steel, the *top* of the rail will not sustain any injury.

On arriving at the foot of a steep incline, the engineer will release the hauling-drum, and may without stopping the engine run it up the gradient to any desired distance.

The driver having released the struts, they come into contact with the rails, and on the engine being stopped and attempting the least retrograde motion, they firmly grasp the rails, and maintain the engine in its place.

The hauling-drum is now started, and the chain draws the train close up to the engine.

The struts on the train are not allowed to come into action, and firmly holds the train in its place, or these struts may have been released before commencing the ascent of the incline, by which means all possibility of accident from the breaking of the chain, or other cause, is entirely prevented.

This automatic action of the struts must recommend itself as a great advantage when it is considered that at present the usual break appliances are entirely dependant on the vigilance and presence of mind of the person in charge of the train.

To prevent danger of over-winding, a simple automatic arrangement is attached to the engine, by which the steam is cut off from the cylinders which drive the hauling-drum the moment the train touches the engine.

The operation which has now been described will be repeated as often as required, until the whole of the gradient has been surmounted.

The author would particularly call attention to this feature of his system, that no particular length of gradient has any influence on its success, neither is it *essential* that the length of the chain should bear any relative proportion to the length of the gradient.

On the level sections, or on comparatively light gradients, the locomotive acts precisely as an ordinary locomotive engine.

It is obvious that this arrangement of hauling-drum and separate winding-engine will also be found most serviceable in facilitating the hauling of heavy trains by light locomotives round sharp curves.

In order to prevent exposure and consequent injury to the tubes and fire box roof, by reason of the displacement of the water-level when ascending or descending steep inclines, there are provided two steam domes, or chambers, on the top of the boiler near the end thereof, and these are connected by an equalizing pipe. The steam for supplying the cylinders of the engine and those of the winding-drum is taken from the domes in the usual manner.

Having thus fully described the principles of the new system, and the means to be employed for carrying it out, Mr. Handyside proceeds to explain all the numerous advantages claimed for it. These we hope Mr. Handyside will at some not distant day enable us to illustrate more fully than we can at present do.

SEWAGE FARMS.

"Will a Sewage Farm Pay? or, Theory Combined with Practice." By Lieut.-Colonel ALFRED S. JONES. V.C., (late 9th Lancers) passed Indian Examination in Surveying and Civil Engineering, and Graduate of the Staff College, Sandhurst. London: Longmans, Green, and Co. 1874.

THIS pamphlet is a noteworthy contribution to our literature on sanitary subjects, aiming, as it does, at affording some aid towards a satisfactory solution of the following increasingly important questions, viz.:—1. How can we protect the inhabitants of large towns and their country neighbours from the evil effects of stagnant sewage? 2. How may we augment the supply of fresh meat, milk, and butter, which even free trade has failed to provide in sufficient proportion to our rapidly increasing population?

No pretension is made to the merit of any new discovery or specific for the long debated social evils referred to in the above questions, the writer indulging in the hope that simple attention and observance of the laws of nature may be trusted to accomplish much that is desirable in both directions

It commences by stating: that amidst the numerous schemes for purifying town sewage, by precipitating agencies, which have cropped up from time to time, the old natural course of irrigation has always held its own, while the former dropped out of notice one by one mainly because, however clear the effluent water from precipitating works may look to the eye, it has really left behind it only those solid impurities which were mechanically suspended in the sewage, and flows out of the precipitating tanks with its burden of chemically dissolved impurities as great or even greater than that carried through the sewers to the precipitating tanks.

These schemes had moreover the disadvantage of being very expensive, and regard for economy constantly led their managers to reduce the proportion of precipitating agents to volume of sewage below that just proportion which would give the maximum effect in clarifying the sewage; but within the last two years General Scott, R.E., has brought forward his cement-making process which more modestly professes clarification of sewage rather than purification which used to be claimed as a result of precipitation by the enthusiasts who introduced the other schemes.

If General Scott can obtain a good market for all the cement he can produce there is every reason to hope that the process may answer his anticipation of effectually clarifying sewage, and thereby facilitate further purification by a smaller area of land than would be required for that purpose if raw instead of clarified sewage were poured upon the land; his success will depend upon the cement market, because considerations of economy must creep in to reduce his proportion of lime unless the sale of cement shall recoup the cost of lime and labour consumed in its manufacture.

If we discard the precipitating schemes, which in their latest form aim only at clarification, leaving purification to be accomplished by the only two agencies (earth and vegetable life) which have ever really accomplished the end in view, and turn to consider irrigation, we shall find that exaggerated notions of the pecuniary results to be expected from sewage farms have in many cases led to extreme disappointment and extravagant demands on the resources of Town Councils.

The success in a sanitary point of view of well-managed sewage farms, whether on an extensive area of land or where large volumes of sewage are concentrated upon small ones for short periods with intervening terms of rest, as in the case of intermittent filtration at Merthyr Tydvil, appears to be generally admitted, but the practical question how far the produce of such farms will repay the heavy charges for rent, labour, and necessary capital has long appeared to be the pressing and all important consideration for the following reasons, viz.:—1. Because if a farmer can be induced to learn as a fact that every drop of town sewage he can put upon his land will return as money into his pocket, the management of the farm may be left to him with a certainty that the sanitary object of purification will follow as a necessary consequence from the operation of the love of self-interest, a common passion of the human race far more likely to be effective than legal penalties, on the farmer, or a sense of duty on the part of Town Councils, committees or their agents, to whose hands sewage farms have for the most part been committed. 2. Because Town Councils and farmers entertain a natural suspicion of scientific authorities who make demands upon their credulity without offering ocular demonstrations to sustain their theories.

Further on the writer alludes to certain sewage experiences of his with regard to the town of Wrexham, and from this he derives one great lesson: after two years' practical study of the sewage question, which, he says, appears to him to be one of general interest to all towns, he takes it as pointing unmistakably to the necessity of adopting in all cases what is called the "separate system," recommended some years ago by Mr. Menzies, deputy-ranger of Windsor Forest, &c., adopted at the camp at Aldershot, and promised by the War Department to be carried out as regards the new depôt centre barracks about to be erected at Wrexham, which will set an example which he trusts will be copied ere long by the municipal authorities for the whole town.

[The "seperate system" consists in simply providing a clear course for all rain-water from roofs, streets, &c., by direct lines above or below ground to the natural water-courses, instead of leading it by street gullies into the sewers and burdening the latter with the double duty of carrying away both sewage and rainfall.]

It is evident that if sewers were constructed of capacity equal to the performance of this double duty, their construction would be far more expensive than if made of size calculated for the single purpose of conveying sewage, and they would have the disadvantage of reducing the rate of flow in dry weather where their gradients are at all flat, and thus allowing poisonous deposits of filth to collect and ferment immediately below the streets in all parts of a thickly populated neighbourhood; whereas if made of a diameter calculated for the sewage which is governed by the artificial water supply of the town, their contents (more especially if the section of sewer were egg-shaped) would be at all times in motion and reach the land upon which they have to be utilised in so fresh a condition that they would be purified thereon before any fermentation could set in to disperse those noxious gases which some hours' stagnation inevitably involve to the loss of the crops and hazard of animal health.

Practically therefore sewers are never made of capacity equal to the double duty thrown upon them in wet weather, and to avoid their standing full on these occasions overflows are provided as above described.

The occasional expense of "flushing" sewers is sometimes used as an argument in favour of the system in which that operation is often administered with a vengeance by natural means rendering artificial flushing unnecessary; but if the sewers are properly constructed, the regular water supply is sufficient to keep everything moving, and even if flushing were necessary the artificial operation, being under control, need cause no foul overflow or inconvenience to any-one.

Colonel Jones (the writer) has, it appears, a sewage farm near Wrexham, as to which he gives much detailed information, accounts being stated in an appendix. These shew a fair profit from his farming. He concludes that unremitting attention to crops, sewage, and markets is the secret of success in making a sewage farm pay, and he adds, it seems to me that local boards have usually failed as sewage farmers from the want of fixity of purpose common to such bodies; they have involved themselves in lavish expenditure at one time, and recoiled into parsimony at another, forgetting that if the labour of cultivation, and "exploitation" of the resources of the farm is not constant, weeds or unsaleable crops must sooner or later be removed from the soil unless the farm is to become a sewage marsh instead of a garden. The labour, in short, must be employed wherever sewage is put upon land and the choice lies between productive and unproductive labour. As to the poisining of milk by sewage farming, Colonel Jones says:—

I had but just begun to send milk for sale in the town of Wrexham when Dr. Smee made the unfortunate mistake which was so fully corrected by testimony on all sides in favour of sewage milk, and whether it was this controversy or the merits of Hafod-y-wern milk which operated as an advertisment I do not know, but the fact is that the demand has increased to such an extent that it has been difficult to make the supply keep pace with it. I have now twenty-five cows, and send two carts every morning and one at night to sell milk at 3d. per quart.

The city of Edinburgh has been supplied for a century or more with milk from cows fed almost exclusively on sewage grass, and it always appeared to me that stronger evidence than that produced by Dr. Smee would be required to refute the testimony of the medical officer of health for that city, give in the report of the Royal Commission on pollution of rivers, viz:—

"The cows in Edinburgh are chiefly fed with grass from the Craigentinny meadows.

"I have failed to detect any bad effects from the use of such grass. All the cattle which have been fed on this sewage-grown grass find their way to our slaughter houses where they are examined by the inspectors and myself. So far as my observation goes the use of sewage grass for the food of animals is unobjectionable.

"If there had been anything in the idea that sewage grass would lead indirectly to entozoic disease it has had plenty of time to develop itself; and Edinburgh is not only the seat of a great medical school, but medical observation is carried to the highest point in Edinburgh, so that it could not fail of being detected."

In a sanitary point of view my experience only confirms that of others that there are few more healthy residences than a well managed sewage farm, or more unhealthy ones than any neighbourhood, whether town or country, in which sewage is allowed to ferment in a stagnant condition.

The motto of all who deal with sewage should be that of the policeman in a crowd, viz.: "Move on": for nature's great law demands that all dead and decaying matter shall as speedily as possible produce new life and be built up into fresh forms of vegetable and animal tissue. If man, the intelligent police who should facilitate the operation of this law, neglects his duty, the majesty of nature will assert itself through the process of fermentation to loosen the cohesion of sewage atoms in order that they may reach the vegetable life for which they are destined in the form of gas if they cannot do so as a liquid; and let us remember that the law of diffusion of gases will then operate without regard to the sufferings of animals who may chance to breathe an atmosphere more suited to the other kingdom of nature than to their own.

DICTIONARY OF LANGUAGES.

"The Treasury of Languages; a Rudimentary Dictionary of Universal Philology." Hall and Co., London.

THIS is a work which will be found of great utility to every person taking an interest in philology or literary pursuits. It contains an alphabetical list of all known languages with the received classification, and accompanied by a synopsis of grammars, vocabularies, &c.

This compilation is stated to be the work of a literary amateur, and although not free from error, will yet be found an industrious and faithful repertory of known facts, which have never before been presented to English readers in a compendious, accessible, and connected form.

THE YEAR-BOOK OF FACTS.

"The Year Book of Facts in Science and Art, exhibiting the most Important Discoveries and Improvements of the Past Year in Mechanics and the Useful Arts; General Science, Electricity, Chemistry, Zoology and Botany, Geology and Mineralogy, Meteorology and Astronomy." By JOHN TIMBS. London: Lockwood and Co. 1874.

MR. TIMBS' Year-Book is so well-known and its value so widely acknowledged, that when we say that the volume for the present year is not less compendious as to interesting and instructive scientific facts of the past year than its predecessors have been for previous years, we say only what is the fact as to this Year-Book of Facts. Those of our readers who may not have possessed themselves of a copy, we recommend to do so. This annual work, though highly useful to all intellectuals, should above all be in the hands of every inventor.

POETRY.

"Lord Harrie and Leila;" a Romance of the Isle of Wight, and other Poems. By HENRY GEORGE HELLON. London: Provost and Co., 36, Henrietta-street, Covent Garden, W.C.

SECOND NOTICE.

As the germ sets the philosopher thinking, so nature is the source of the poet's inspiration. To confirm this we need only refer to the poetry of the ancients; to Chaucer, the great father of English poetry, or our more recent poets who shone during the early part of this century. In Percy's reliques, the most valuable collection in our language, we have many proofs in support of this.

What is poetry? is a question often asked, and few there are who are prepared to answer it. Were poetry better understood, much that now passes for such would never have seen the light. The host of imitators now springing up are innumerable—would that these would only learn that to be a poet is to have the power of invention.

Poetry, said Shelley,

> Is the record of the best—and happiest moments
> Of the best—and happiest minds.

It is the utterance of a passion for truth, love, and beauty—akin to music and painting. In the imagination it brings to the mind's eye the loveliest form of all things in nature, and in its fancy it plays as the sunlight on the clouds—and, more than all, "is a joy for ever."

There is much in these poems well worth the perusal of those who appreciate poetry; the vein of melody throughout is fine. The stanza which appears best to suit Mr. Hellon, and of which he is a thorough master, is the octosyllabic; this form, when written in lyric iambic quatrain, is undoubtedly the best for narrative poetry. On page 52 we meet with the following stanza, intended to convey the idea of the early sunrise:—

> The dew o'er nature woke to sigh,
> And waft a blessing to the sky.

And on page 97, canto 6 :—

Fairest of valleys, smile away!
Thy charms woo many a step to stay,
Thy village, nestled 'neath the shade
Of shrubland, grove, and sunny glade ;
Thy myrtles, vines, and blooming flow'rs
O'er running love's celestial bow'rs ;
Thy river gliding on to greet
Each cottage home and fairy seat ;
Thy winding hill bedecked with trees,
Which answer to the passing breeze.

The description of Leila, as she listens to the song of the nightingale, with

Her tresses waving in the wind

is very charming.

It is difficult in this stanza to change from gay to grave, but we find Mr. Hellon equal to the task. On page 79 we are reminded of the mossy walls of the antique church of Brading, once the scene of the revelries of the monks of Ina, which—

Awake the past, and each grey stone
Peers in the moonlight sadly lone ;
And lesson like, as if 'twould preach,
We list its solitary speech.

It rarely falls to us to read poems with such a variety of stanza. Poetry, being an inspiration, must necessarily be written in the verse that such inspiration is received. The poem of "Lord Harrie and Leila" opens with the octovarima, but concludes with the octosyllabic. Of the sonnets we cannot speak too highly. Perhaps no one is a greater authority on the sonnet than Leigh Hunt, and no one shewed a greater love for it than Keats. It is strange that such a genius as Shakespeare should have died in the belief that his sonnets were the only immortals of his writings ; still stranger is it that he did not know how to write a sonnet, for those extant are very faulty ; they are now rarely read. Indeed, even his warmest admirers seem scarcely aware of their existence. The sonnet is of Italian origin, of which the following is a specimen from Mr. Hellon's poems, page 272 :—

To Morning.

Thy blush, Aurora, is my soul's delight!
I love thy glow, awak'ning me from sleep,
And join in Nature's melody to keep
Thy sacred day—and climb the hilly height
To sate in shades which speak thy sov'reign might.
If there's on earth a happiness I seek
More dear than death—O! 'tis my soul to steep
In *faery* bow'rs, and watch thy wingèd flight.
E'en from my cradle, ere I knew the grief
That wrings the heart—ere this sad life is run—
My soul in adoration did unsheaf
Her tiny wings to revel in thy sun!
And should they reach threescore, or be but brief,
Still will I love thee as when they begun.

"Arlon Grange and a Christmas Legend." By William Alfred Gibbs. Author of "The Story of a Life," "Harold Erle," &c., &c. Artist's edition. London: Provost and Co., 36, Henrietta-street, Covent-Garden.

Mr. Gibbs has here presented us with another effort of his muse, which, for the present, we must be content with commending to our readers as a work of considerable poetical merit, of high-tone morals, and narrating a pleasing story. We shall probably soon find an opportunity for a fuller notice of it.

BELL'S SYSTEM OF CONSTRUCTION OF IRON WAR SHIPS AND FORT FACES.

The following is the substance of the paper read by Mr. R. Bell, C.E , F.R.I.B.A., with the discussion that ensued thereon, at the meeting of the Inventors' Institute on 16th April, 1874 :—I propose (said Mr. Bell) to bring under your notice this evening the following description of a mode of constructing iron armoured vessels of war and the fronts of forts, capable of resisting artillery of the heaviest description; armour, the power of which can be increased to any extent that it will be possible to increase the power of artillery, and in which teak or oak are entirely discarded. That is to say, I construct the ribs and frame similarly to the present mode, and I build up the bottom and sides by stringing a series of iron strakes horizontally, one upon another, interlacing them like the planking of a wooden ship. The surface and subface of each strake have double parallel grooves or sinkings for their whole length, making them somewhat in the shape of a railway bar before they are placed in position; and, to break the direct passage of the shot, a smaller bar or strake made with grooves or sinkings in all respects similar to, and to correspond with, those of the larger strakes, is introduced, and the projections of the smaller strakes, when brought together with those of the larger, form a system of cells the use whereof is explained hereafter. The bars, large and small, are strung together over wooden perpendicular templates, with a layer of tarred felt on the inside between every bar, and another thickness of mahogany in the outside joint. When, say, five or six of these strakes, large and small, have been laid, a collar is inserted embracing the inner perpendicular template, and also the rib of the ship, acting like, and instead of, a trenail. One of the wooden templates is then withdrawn, and is replaced by one of red-hot iron, passed down through the same orifice, and keyed at the bottom, and at the same time the collar or trenail is keyed to the rib of the ship; then the remaining templates are withdrawn and replaced in the same manner, and keyed in the same way. It is not necessary that these templates should be one continuous length, they may be of any convenient length.

It is obvious that these strakes may be made any width that may be desirable; at least as wide, if necessary, as the plates now in use, and the perpendicular compressors or cramps can be also any number or size; and, with the aid of the felt and mahogany, will be impervious both to water or shot.

Thus it is seen that no wood, except it be desirable, is used in my construction, by which a great saving is made. I have never been able to discover any logical reason for its use. If iron be better than wood for external defence it is equally so for backing; a cubic foot of each material, oak, teak, and iron weighs consecutively as follows:—oak, 45,453 lbs.; teak, 42,539; and iron, 480 lbs., consequently iron has 10,582, or 10½ times the solidity of oak, and 11,283 or more than 11¼ times the solidity of teak. And with respect to tenacity iron has 7 and 8 times the tenacity of oak and teak respectively; therefore, for all reasons the application of wood is a great mistake.

The strength of a ship thus constructed as I propose lies in the direction of the force intended to be applied, and it is the only mode known at the present of constructing iron capable of offering opposition to the challenge of Sir William Armstrong or Sir Joseph Whitworth with effect, and it will continue to do so whatsoever may be the power of their artillery; ramming the stem and bows acquire all the force, and in case of impetus of the armour in the rear even as far as the stern without any unequal strain on the sides, and all weight that would be given by additional thickness adds to that power, whilst by the present mode of iron plating, every additional thickness of iron by so much overloads and weakens the side of the ship, and the tendency of the rear plates, which are only screwed on, being to thrust off those on the bows, there might be great danger that one of the effects of concussion, if of an effectual kind, would be to send the ship and her crew to the bottom.

Again, the strength of my mode of construction gives the power of building any increased width of beam, and obtaining a corresponding decreased draught of water.

Torpedoes may be exploded against such a vessel in vain, and it would resist the running on many a shoal with impunity.

The purpose of the cells formed in the iron planking is to overcome objections to solid iron plating, namely, now that part of the plate struck by the shot, being first compressed by the impact to the extent of its compressibility, the outer and inner faces of the plate are then acted on simultaneously, and as the iron cannot expand laterally, because of the density of the surrounding iron, its resistance is confined to the same area of plate as first received the impact, and the fibres of the iron are cut with comparative facility and driven inward in the direction of the line of fire. But the cells cause the shot to create increasing resistance to itself, as the iron with which it comes in contact is enabled, when driven to expand, laterally thus filling in the cells that are made barely sufficient to receive the iron and which becomes crushed into a solid mass against the heavier mass of the internal iron of the strake, which becomes similar to an anvil, and the shell would thus, it is believed, explode at this point and the contents be returned on those who fired it.

One of the compressors, five inches by two inches, according to Kirkaldy, would compress the strakes together with a force of 290 tons. Six of them placed as shewn in the drawing would together exert a force of 1,740 tons; and a similar double tier, at the distance of four feet on the one side, and others at a corresponding distance on the other, would in every fourteen feet exert a compression of 5,220 tons; and, they are so protected in the construction, as to be entirely out of any probable damage from shot. This power can be increased to any extent. As the whole vessel would be constructed in this way, it is not too much to say that no other vessel has ever been constructed with strength at all comparable to this method.

With respect to forts, their construction being almost similar to that for the sides of ships, it is submitted that a much closer battery can be made by this mode of construction than by any other, and it is capable of quicker ventilation.

Thus I have explained to you my plan. It is entirely novel in itself, although it cannot at the present time be said to be new, for it is something like nine or ten years since the time that the construction of a *Warrior* was the subject of general consideration that I brought my plan under notice of Sir Spencer Robinson; he introduced to me a gentleman to discuss the subject whom he called his wooden constructor.

I found, however, I could make very little way with Sir Spencer or his wooden constructor, for his estimate of the possibilities of iron was so low as to lead him to say "that he would rather go out and fight a wooden ship than any iron ship in existence." I told him that the chances were that he would never have the opportunity of fighting any other ship, and advised him for his own safety that he had better stop at home. I have essayed on several occasions since to get my plans before the Admiralty through the officers connected with it, but I always received the usual notice, that my Lords thanked me for my trouble, but could not advise her Majesty to adopt my plan.

Mr. Bell here entered upon a history of his treatment by the Admiralty, which was of the same unsatisfactory kind as inventors usually experience. He concluded with some observations on the inefficiency of the present armouring plan for ships, and the superiority of his own invention.

After this paper had been read, the chairman (Captain Selwyn) solicited discussion, when Mr. J. M. Hyde said he would like to ask Mr. Bell if he had made any experiments to ascertain whether a cellular structure would offer better opposition to shot than a solid mass. It appeared to him that the cost of a target constructed on Mr. Bell's system would be very great, as it would be necessary to make special tools of an expensive kind in order to construct it. He would also like to inquire whether Mr. Bell considered any preference was to be given to any particular shape of cells. He could well understand that a properly constructed cellular body would be better than a solid mass for resisting the effect of shot, but as he was one of those who thought that artillery would always beat armour, and that guns could be made to carry shot that will go through anything, he doubted the value of heavy armour. He might observe that the Government is about to build a ship with armour two feet thick. His own view was, that protection from the effects of shot would be more readily attained by protecting the ship's sides by iron inclined so as to cause richochet action. Such a system as Mr. Bell's was, to his mind, very difficult to reduce to practice, for he did not see how he could remove any portion of the ship's sides for repairs unless by removing all strakes from top to bottom, for, otherwise, the removal of the keys and tie-bolts would be a very difficult affair.

Mr. Hamilton Pendred also thought there would be great difficulty in getting at the tie-bolts to repair any damaged portion of the side, for the action of shot would be to weld the plates up together.

It having been suggested that Captain Selwyn (the Chairman) could give much information on the subject under discussion,

The Chairman then said he would, in the first place remark, in relation to Mr. Bell's concluding statements, that the Admiralty cannot be expected to spend money unless the nation votes it, and as the vote for experiments had been cut down from £12,000 to £2,000, under such circumstances it could not be said that the Admiralty was much to be blamed. We should never get a satisfactory system on these matters until a scientific commission be appointed, composed of competent persons selected without regard to political considerations. One great difficulty with reference to shipbuilding was that, as a rule, we proceed by blindly copying old forms, and it was therefore cheering to find anyone like Mr. Bell proceeding by reinvestigating scientifically the basis of the art. Mr. Bell's system raised the question of the value of absolute rigidity of structure, which had been gone into very thoroughly by railway engineers, and it had been settled that perfect rigidity was not desirable. On the whole, he was inclined to consider that a cellular system of iron war ship construction, such as Mr. Bell's, was worthy of trial. With regard to the effects of shot, many persons thought its racking effects on the plates was the great danger to be met, but the Americans have given up the rackin theory, and go in for piercing. As bearing upon the behaviour of cellular or hollow constructions, he might observe that a tubular bolt was better than a solid one, for plates had not been forced off when fastened with tubular bolts, as in the case of those fastened with solid ones. The question of repairs was very important, for if upon being struck the ship became disabled, and could not be got to sea again from not being capable of being repaired on the spot, very serious results would often ensue. He quite agreed with Mr. Hyde that no reasonable limit for the size of guns existed, and consequently the power of artillery might be said to be unlimited. In dealing with naval constructions and resistance to artillery, he would call attention to the fact that it is quite possible to have the guns carried below the water and to raise them for discharge, and then lower them below the water, which would enable vessels to be built so as to leave little of their structure capable of being affected by shot, for no shot does much harm in water. With regard to the suggestion that a proper inclination of surface of the ship's side would be protective against shot, he must remind them that by the action of the waves the angles would be so altered that the shot would often meet the side at an angle not suitable for turning it. To return to Mr. Bell's plan, he must say that the system of keys and ties, instead of bolts, was good—assuming the difficulty as to repairs to be met—which mechanical ingenuity would probably overcome. Finally, he would observe that if invention is to have fair play in regard to the public service, its advancement must be made a hustings question, so that wise expenditure in experiments be fully provided for out of the nation's purse.

Mr. Bell, in reply, remarked that he had tried experiments that satisfied him that the cellular construction was the best, and he felt confident that he could neutralize the power of artillery. As to the difficulty of removing the keys, it was not so great as many persons imagined, for openings would be made inside so as to get at them. He concurred in most of the observations of the Chairman, whose opinion was worthy of the highest regard, but he considered they all went to support his views. Indeed, he considered Captain Selwyn had answered nearly all the objections urged by other speakers.

The Chairman then proposed a vote of thanks to Mr. Bell, which, being seconded by Mr. F. H. Varley, was carried unanimously. After which a vote of thanks to the Chairman was proposed by Mr. Carttar, seconded by Mr. Murray, and carried unanimously; and, having been duly acknowledged by the Chairman, the meeting dissolved.

RAISING SUNKEN SHIPS.

By Mr. T. Vafea.

The following is, in tenour and effect, the paper read by Mr. Vafea at the meeting of the Inventors' Institute, 6th March, 1874. At the opening of the paper he said that the subject he had to lay before the meeting was one of great interest and importance; and then proceeded to describe the improvements he wished to submit to the consideration of the meeting, therein referring to the specification of the patent (granted to C. and T. Vafea), which stated:—We close hermetically the hatches, the deck lights, port holes, and all the windows or openings in the deck or upper or side parts of the ship, and after having so hermetically closed the said openings in the ship, we pump down air to the bottom of the ship through a tube or tubes which we insert either through the bottom of the ship's hull or through the ship's deck, and which tubes we pass down close to the bottom of the ship. The air so being introduced into the bottom of the ship rises by itself inside of the ship towards the underside of the deck, and not being able to escape presses the water contained in the ship down and out of the ship through the hole made by accident, or through holes which are to be made in the ship's bottom, to allow of the escape of the said water.

The apparatus which we use for the hermetically closing of the hatches, or other openings in the ship, consists of a sheet or sheets of indiarubber or other soft packing substance, and a plate or plates of iron or other suitable material, which plates are held down and fastened to the hatches or other openings by suitable screw bolts. This apparatus may also be used for keeping buoyant ships or vessels which may have met with accidents to their bottoms.

For raising sunken ships, steamers, or vessels which have been so broken as not to admit of being closed sufficiently tightly for the insertion of the air in the manner we have above described, and also for raising other submerged property, we use pontoons or other ships or vessels which are to be sunk, and attached to the broken ships or other submerged property, which pontoons or ships are then to be raised in the same manner and according to the same principle as we have described in respect to the sunken ships bringing with them to the surface the broken ships or other submerged property.

Take as an instance a ship. The ship or vessel is fitted with apparatus for the purpose of raising it, such apparatus having been placed and secured by divers, and the hatchways being covered with iron plates. Between the plate and the upper edge of the combing of the hatchway a sheet of vulcanised indiarubber or other soft packing material is laid. Such plate is secured by a cross bar which enters the hatchway and takes a secure bearing at each end beneath the ship's deck, and to the cross bar bolts are secured, which extend upwards through the indiarubber sheet and through the plate, and they receive nuts on the upper side of this plate which, when screwed down, compress the indiarubber sheet or elastic packing material, and make an air-tight joint against the top of the hatchway combing. If the hatchway be wide, the plate is further secured by two dogs, which are able to slide upon a bar to adjust them to the width of the hatch. The ends of the dogs being provided with suitable teeth, are made to clip the hatchway combing tightly between them, and the teeth penetrate it on either side. The bar, to adjust the width to the hatch, being thus fixed over the plate, the screws, which also work in holes in the bar, are screwed down, and they aid in pressing the plate home so as to ensure an air-tight joint. These bars and screws, and parts connected with them, may be applied either longitudinally or transversely of the hatchway, and the screws which they carry may be increased or diminished in number.

The plates which cover the hatchways are provided with stop cocks, by means of which the air may be controlled, allowing the air to escape whenever it is wished to lower one end of the ship which may be rising before the other. For closing the ports and other apertures in the ship or vessel similar means are employed.

Tubes of any suitable material (one or more as may be required) are attached and inserted through the bottom of the ship's hull, and their mouths enter holes formed to receive them. Through these tubes the air is pumped down to the bottom of the ship, and is caused to enter the ship close to the bottom.

The air being so introduced is left there at the bottom of the ship to rise by itself inside of the ship towards the underside of the deck, and not being able to escape, it presses down the water and expels it through the holes made in the bottom, and the upper ends of the tubes are connected with air pumps or other air forcing apparatus on board the ship or ships from which the operations are conducted, and also at their upper ends the tubes are provided with stop-cocks, which are closed when pumping ceases, and thus the air is confined, and the tube is kept free from water to facilitate the work when pumping recommences. The tubes have also valves at their lower ends which close against the water, and so also prevent its entrance into the tubes.

The above tubes are fixed either through the deck and extend down towards the bottom and close to the bottom of the ship, or passed outside of the ship's hull to the bottom of the ship.

Where the sunken ship or vessel is so damaged that the apertures in her cannot be closed in the manner above described, we employ pontoons or other ships or any other vessel which, after sinking, we firmly attach to the sunken ship or vessel. The pontoons are constructed of iron, and we prefer them of a particular form with flat ends, or in some cases we make them with pointed ends, and provide them with steam power and steering gear to facilitate the conveyance of the pontoons to the places where they may be required for use; and they are made in air-tight compartments. They have openings made quite close to their bottom, by one or more of which openings the air is to be introduced in the manner already described in respect to a ship of which the upper works are capable of being closed air-tight. The said pontoons are provided with stop-cocks by means of which the air inside the pontoon may be controlled; we allow the air to escape whenever we wish to sink the pontoons or we close the stop-cocks to control the descent of the pontoons in order to bring them to the position required. The said pontoons are sunk alongside of the ship or steamer or vessel or other weight to be raised, and having been secured to it, we make them to float by pumping down air to their bottoms through tubes, such as those used for the ships, such tubes being attached and inserted to the bottom of the pontoons from the outside or inside part of their body.

Thus the air being caused to enter into the body of the pontoons and being left there at the bottom of the pontoon, rises by itself inside towards the upper part of the pontoon, and not being able to escape it presses the water contained in the pontoon down, and expels it out of the pontoon through suitable openings. We use such pontoons sometimes as auxiliaries in the raising of ships or vessels, of which the upper works are capable of being closed air-tight. The pontoons when filled with air rise, as is the case with a sunken vessel similarly treated, and in rising they drag to the surface the ship or other weight to which they are attached. The number and size of the pontoons required will depend on the weight which is to be raised.

This our principle of introducing the air from below and allowing it to rise by itself, we apply it to any other kind of vessels which we might send down, and attach to the sunken ships or other submerged property for the purpose of raising it.

By hermetically closing the hatches and other opening of ships with air-tight covers, the risk of foundering may also be greatly reduced, as when the ships are provided on their voyage with the apparatus described, namely, the air-tight covers, the air necessary to flotation is confined within the ship, and will keep the ship always buoyant, and will not allow the entrance of any water, in case the ship might meet with accident to its bottom. One or more of the tubes may also be provided, fixed either through the deck and extended down close to the bottom of the ship, or passed outside of the ship's hull at the bottom of the ship, through which tubes the air may be sent down and introduced to its bottom, and which air rising into the ship takes the place of any water which might have penetrated into the ship, and expels it, so getting rid of any leakage which might occur. The ship may also be provided with stop-cocks upon the deck, which stop-cocks may be employed on the voyage for ventilation of the cargo, the air in the ship being so renewed by opening the air-cocks during the day and closing them at night for safety.

We prefer that hatches should be of a circular form, and this would facilitate air-tight closing.

Mr. Vafea, at the conclusion of his paper illustrated, by experiments on a model boat the practicability of the plan.

The paper having been read and illustrated as above mentioned, the chairman invited discussion; when

Mr. **Bell** said he would like to refer Mr. Vafea to the case of a vessel now in the London Docks with a very heavy cargo of wool; masts all made for the purpose of ventilation, hollow with perforations at the bottom; also other ventilating tubes so as to carry out a thorough system of ventilation. He would ask would not such a vessel present difficulties to the carrying out of Mr. Vafea's plans?

Mr. **Murray** thought that if the plan were found to be true in principle and capable of being carried out in practice, vessels should be constructed so that the plan might be worked whenever mischance so render it necessary to apply. He thought the present construction of vessels very unsafe. He could not fall in with the idea of closing up the vessel in stormy weather to render it buoyant; as what was to be done with the crew? Although, for the purpose of rendering the ship buoyant, he considered the invention quite practicable. He would like to know what amount of displacement was necessary to render the vessel buoyant?

Mr. **Vafea** explained that the lower decks only, if kept closed, will be quite sufficient to keep the vessel floating, so leaving all the upper decks for the convenience of the crew, as, according to the experiments, two air compartments would be sufficient.

Mr. **Calley** said he did not see how the air could be forced into a wool ship; compressed wool was so heavy; and he would ask was the power of air sufficient to displace the water in such a case He also thought that the cargo in a ship would be a difficulty that should be taken into consideration.

The **Chairman** (F. H. Varley, Esq.) explained that the principle of this invention was the displacement theory, and naturally the injected air would fill all open spaces, and the ship be brought to its former condition.

Mr. **Macomber** remarked that all boats considered life-boats have buoyant air compartments which will float the whole vessel; and, for himself, he would say that, although there might be practical difficulties in the way of carrying out this plan, he did not see why they should be considered insuperable. If Mr. Vafea was right in his theory—and as far as an opportunity was afforded for forming a judgment that evening was concerned, he appeared to be right—then no doubt his invention would meet with such practical acceptance that the construction of vessels would be brought into accord with it.

The **Chairman**, having made a few concluding remarks of a general character, proposed a vote of thanks to Mr. Vafea; this being seconded by Mr. **Carttar**, was carried unanimously.

At the same meeting an invention by Mr. Debenham was introduced to the meeting. This we reserve for future notice. Mr. Debenham also received an unanimous vote of thanks; this being briefly responded to, an unanimous vote of thanks to the Chairman closed the proceedings.

THE PATENT LAW CONFERENCE.

At the meeting of the Inventors' Institute on the 2nd April, 1873, Mr. F. H. Varley, executive chairman, presiding, the conference on the Patent Laws was continued. The proceedings commenced by the secretary (Mr. F. W. **Campin**) reporting what was done at the last meeting of the conference (see our last issue, page 50), after which he read various communications on the subject, to the effect that a large reduction of fees is required, and the law generally amended, so as to render patents cheap and protective.

The **Chairman** then made some practical remarks, pointing out the necessity of cheapening the process of obtaining patents, and increasing their effectiveness.

Mr. **Newton Wilson** said he was afraid his notions of what Patent Law ought to be would, in some respects, differ from those of many members of the Institute. As to the cost of patents, he certainly would like to reduce the cost, but in any case would abolish the £50 at the third year, and the £100 at the seventh year, and instead of those payments would substitute an annual tax of £5. He thought there should be examination preliminary to grant of patent, and that the results of examination should be certified. He was in favour of the Patent Museum being on a grand scale, as he considered it would benefit inventors in many ways, and he advocated the system of compulsory licenses, and could not vote in favour of indefeasible patents, for he could not help thinking that patent-right was a peculiar privilege from the Crown, and not a simple legal right like property rights in general. But leaving the theory of the matter, he would now address himself to the practical, for it seemed to him that the present Government was a hopeful one for inventors, and even Lord Derby appeared to be converted as to patent law—if one might judge from his answer to the International Patent Law deputation the other day. He was in favour of the Institute organising an influential deputation to the proper member of the Government, and probably the proper official was the Lord Chancellor; but, of course, if a deputation were decided on by the council of the Institute, they would take care of that part of the question.

Mr. **Murray** said he could not help rising to object to compulsory licenses; they would, in many cases, be fatal to an inventor's interests. He also differed from Mr. Newton as to the indefeasible title to a patent; he thought that might, and ought to, be provided for in any amendment of the Patent Law. There was no valid reason why an inventor should have a weaker title to his property in his patent than a landowner to his land; in fact, an inventor, being an originator, or creator, had a stronger right than a landowner, who was, in reality, only an occupier with legal permanence.

Dr. **Haseltine** said the question of compulsory licenses was very difficult. In the abstract he objected to compulsory licenses; but it seemed to him to be a practical question of this kind—either no Patent Law or compulsory licenses. The Continentals (said Dr. Haseltine) are in favour of compulsory licenses. Americans are generally very strong against the system. At the Vienna Congress he did not himself vote for or against. In theory, he would say, no limitation of rights, but in practice it might be, and he thought it was, desirable, if properly guarded.

Mr. **Yates** said all this difficult question about compulsory licenses might be put aside by requiring, as in France, the patent to be kept at work. For his part, he thought an inventor ought to have a patent as a matter of right, and that it should be a perpetuity so long as he paid one-tenth of the profits to the State.

The **Chairman** said that he gathered from the statements of the gentlemen who had spoken that evening, and also from the communications that had been addressed to the Council, that, notwithstanding the diversity of opinions enunciated, there was concord as to the desirability of cheaper and more protective patents. In regard to the system of compulsory licenses, it seemed to him that in the event of International Patent Law being established that system became almost a necessity; but it must be fenced round with safeguards. As to indefeasible patents, the Inventors' Institute had in its Invention Right Bill put forth a plan which had been submitted to several eminent lawyers, and they had not pronounced it to be impracticable; so it could not be considered impossible or improper. As to the practical aspect of the question, at the present moment it seemed to him that the Inventors' Institute should now address the Government on the subject.

Mr. **Newton Wilson** then moved, and Mr. **Yates** seconded, the following resolution:—"That the Council be recommended to apply to the Government at an early date, soliciting them to take action for the amendment of the Patent Laws."

This being put to the meeting was carried unanimously, and with a vote of thanks to the Chairman the meeting ended.

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ESTABLISHED 1ST MAY, 1862.

Past Presidents:

SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

Chairman of the Council:

SIR ANTONIO BRADY.

NOTICES.—SESSION 1873-4.

Attendance of Members and their Friends is requested on—

THURSDAY, May 14th.—Annual General Meeting, at 4 o'clock p.m.

THURSDAY, May 28th.—On "Elastic Screw Shafts and Thrust Blocks." By HAMILTON W. PENDRED, Esq., C.E., at 8 p.m.

TO MEMBERS OF COUNCIL.

Council meetings to take place at half-past 3 p.m. on 14th, and 7 p.m. on 28th.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

At the meeting of the Council (ordinary and special) held on April 2nd, 1874, Mr. F. H. Varley, Chairman of the Ordinary Council, presiding, the minutes of the last Council having been read and confirmed as correctly entered, the Secretary reported that the Rules' Committee had met and discussed the present rules, and suggested amendments, but were not at present prepared to make a report.

It was resolved unanimously that in any alteration of the existing rules the establishment of an Executive Council ought not to abolish the General Council, as a consultative body, in cases in which its co-operation may be desirable.

Members recorded—Messrs. J. B. Bradshaw, N. H. Hughes, and J. B. Hawley, A.I.C.E.

At the meeting of the Council (ordinary and special) held on 16th April, 1874, Mr. F. H. Varley, Chairman of the Ordinary Council, presiding, the minutes of the last meeting of Council (ordinary and special) having been read and confirmed as correctly entered, the Secretary submitted the draft accounts as further amended by himself, when it was ordered that they be remitted to the auditors to take such measures, in conjunction with the bookkeeper, as to have them complete and audited for the annual general meeting on 14th May next.

The Secretary reported that at the last members' meeting a resolution was passed recommending the Council to take action to bring the Patent Law question before the Government without delay. It was thereupon ordered that the Secretary do take steps to attain that object.

Member recorded—J. Farran, Esq.

At the members' meeting on 2nd April, 1874, F. Varley, Esq., presiding, the Patent Law conference was continued. The report of the proceedings is given in another column.

At the members' meeting on 16th April, 1874, Capt. J. H. Selwyn, R.N., Vice-President of the Institute, in the chair, Mr. R. Bell's paper on "The Construction of Iron War Ships, &c.," was read and discussed. The report will be found in another column.

Monthly Notices.

Effect of the Electric Current on the Wire.—Dr. H. Streintz, whose observations have been submitted to the Vienna Academy of Sciences, finds that the current produces an alteration in the elasticity of the conducting metal, but only such as would be due to the heat developed in the wire. The expansion of the conducting wire, however, is greater than would be produced by heating it to the same temperature; but an exception to this law appears to be furnished in the case of hard steel. When the current is transmitted, the wire expands, not suddenly, but gradually, just as would be the case under the influence of heat alone.

Dr. Helmholtz has recently brought before the Académie des Sciences de Berlin, a paper "Sur la Polarisation Galvanique dans les Liquides dépouillés de Gaz."

A German Government is fitting out, at Kiel, a deep-sea exploration expedition. We believe it will leave Europe in the month of June, and that some portion of the South Atlantic will be sounded and dredged. We are glad to know that Prof. Neumayer, the Hydrographer to the German Navy, is using his influence in the cause of science in so serviceable a manner.

The Library of the Geological Society is in course of removal to Burlington House. It was hoped that the transfer might be completed by the 29th of April.

The Death of Dr. M. Von Jacobi, so well known as the originator of the electrotype process, is reported to have taken place at St. Petersburg on the 10th of March, although Dr. Jacobi also made many important experiments on a large scale, on the application of electricity as a motive power, and recently he has very successfully rendered the electro-disposition of iron a practical feat.

Les Mondes prints in full, from the *Archives de Genève,* a complete memoir, by Prof. Kopp, upon the aniline colours of the Vienna Exhibition, compared with those shown in Paris in 1867.

The Conversatione of the President of the Institution of Civil Engineers, Mr. T. E. Harrison, will take place in the West Galleries of the International Exhibition, on Tuesday, May 19th.

The Curatorship of the Patent Museum, South Kensington, has been conferred on Col. Stuart Wortley, in the place of the late Sir F. P. Smith.

The Experiments of Prof. Robert H. Thurston on the increase of resisting power of metals under stress have been repeated by Com. Beardsle, proving that the increase of resisting power is equal to 13·1 per cent. in 17 hours. The importance of these researches make it very desirable that still further researches should be made on the effect of prolonged stress, compressional as well as tensional, and with various materials.

A Gunpowder Pile Driver, by Mr. F. C. Pringle, is described in the *Journal of the Franklin Institute.* The enormous power developed by the explosion of confined gunpowder has been thus utilised with great advantage in the United States. The journal referred to describes the apparatus employed, and gives drawings of it.

Death of Mr. Owen Jones.—The decease of this eminent artist, to whom, more than anyone, we all of us owe much relief from the depressing monotony of universal whitewash and monochrome, has been recently announced. He was one of the few remaining men of eminence connected with the building of the Great Exhibition, 1851.

Death of Professor Phillips of Oxford.—We regret to have to announce, as the result of accident, the death of this eminent geologist.

The Eighty-one Ton Gun.—The *Engineer* states that the first four of 81-ton guns, which are to form the armament of the future ironclad *Inflexible,* will be proceeded with as soon as the experimental one has been completed and proved. The total length of the new gun, including the plug screwed in at the breech end, will be 27ft., and the length of bore 24ft. In the first instance the calibre will be 14in., but ample provision is made in the thickness of the steel tube to increase that figure to 16in. if deemed desirable. The rifling has not as yet been decided on, but will be a matter for consideration as the gun approaches completion. Neither the weight of projectile nor quantity of powder to be contained in the cartridge for the 81-ton gun has been positively fixed, but the first will probably range between 1,000lb. and 1,200lb., while the second may be estimated at about one-sixth of that amount.

Correspondence.

CARMICHAEL'S LIFE-BOATS.

To the Editor of the Scientific and Literary Review.

Sir,—I mentioned in my paper that I thought a modification of my patent might be useful as a life-boat. I have thought of various modifications, and prefer the one of which I send you an account.—I am, dear sir, yours truly,

Dr. S. Carmichael, M.D.

DESCRIPTION OF CARMICHAEL'S PROPOSED LIFE-BOAT.

1. A straight horizontal deck, about 26 feet long, and 8 or 10 broad, the middle part being a rectangle about 20 feet by 8 or 10, the two ends being rounded. This deck, which is not meant to be all watertight, may be about 2 feet, more or less, above the water line.

2. The deck is supported at this height by two horizontal tubes, containing air, one along each side, about 2 feet, more or less, below the deck; these tubes are united to the deck by four or more strong iron bars, or vertical cylinders containing air, securely fixed to the deck, and by wire braces to the sides, &c. The horizontal tubes may require to be longer than in the plan.

3. An iron keel, 2 feet or more below the middle of the deck, fixed to the central line by two or more strong bars, and to the sides by thick wire braces. If a screw and tube were adopted, this would serve the purpose of the iron keel in helping to right the boat when upset, &c. These parts should be securely fixed together by iron rods and strong wire braces in all directions, so as to form one inseparable body. The braces are not represented.

4. The deck is surrounded by a railing, with numerous openings, through which bodies may be dragged out of the water.

5. Air-tight seats. These may be carried across the deck to make it more buoyant if necessary.

6. Gaps in the deck, through which bodies may be dragged out of the water, generally covered by a grating.

7. There may be a round cabin in the middle of the deck, or a space in the middle surrounded by air-tight seats, or partly by cylinders containing air.

Rope steps or ladders may be fixed all round the deck. Both ends are meant to be alike, and there should be a rudder near each end. I have not mentioned the diameter of the horizontal tubes, as that will depend on the sp. gr. of the whole mass; but I propose that they should be nearly covered by the water when the boat is very heavily loaded.

By such an arrangement I expect that when a wave comes it will pass mostly under the deck—that the central cabin or space may be kept pretty dry—that the heavy central keel or tube, placed lower if necessary, will enable the vessel to right itself if upset—that it will suffer less from the shock of the waves, and be less liable to be upset, since there is no continuous compact side placed in the best possible position for a wave to upset it, viz., obliquely upwards and outwards, as in life-boats generally, but little more than a few thin rods and thick wires, against which the waves will have little influence.

BIBLE AND GEOLOGY.

To the Editor of the Scientific and Literary Review.

Sir,—The Bible and geology are supposed to be at variance as to the duration of this our world, but is it impossible to receive the suggestion which has been advanced both by science and theology, from their own stand-points, that this our world is not a primary, but renewed creation; and, if so, may it not be that it is our planet which has been millions of years in existence, not our present world? "We are familiar with the fact in chemistry that, on the proper combination of certain elements, new substances flash into being in a moment—when the conditions for a change, and such conditions may be external to themselves, are complete, the change may take place, not by slow gradations, but by sudden start." Might not, then, Almighty Chemistry, by the combination of past chaotic elements, when the conditions for a change were complete (through long process of gradual preparation), re-create a destroyed world by sudden start—sudden as man reckons time, *even* admitting that the Hebrew "day" be a thousand years? May not geologists be finding traces of a past world in the process of renewal?

H.

PHRENOLOGY.

To the Editor of the Scientific and Literary Review.

Sir,—Your correspondent's letters in defence of phrenology in your issues of March and April, must have been read with pleasure by all who have found, by practical experience, the virtue of this useful—though much abused—science.

It is unfortunate that a science of such great value should have fallen into the hands of empirics, whose method of manipulation has brought reproach on its teachings. Still more unfortunate is it that those who have written much to condemn it should have so lightly passed over the works of Dr. Gall, the founder of the science. Many who have not read Gall's "Sur les Fonctions du Cerveau" concluded that he is answerable for the idle belief in certain "bumps" developed on the head, where as it is not so. Dr. Gall says:—"Jamais je n'ai prêtendu distinguer des modifications peu prononcées des formes du crâne, ou des légères nuances du caractérè."

That phrenology is a service of great value must eventually be acknowledged by anatomists; there are too many truths extant in support of its teachings to admit of its being quashed, while the numerous discussions on the subject will but strengthen the cause, and win round its portals a crowd of scientific men. If phrenology were more studied, mental phenomena would no longer remain a mystery. To test its truth upon living subjects as proposed by Professor Ferrier, appears to me a physical impossibility; were a dog to be placed under the surgeon's knife and deprived of part of its brain, how could it at such a time be discovered whether the creature had lost its love for its master, or knowledge of locality?—I am, sir, your obedient servant,

Henry George Hillier.

Proceedings of Societies.

ROYAL SOCIETY.

March 26th.—The President in the chair.—The following papers were read:—"On the Organization of the Fossil Plants of the Coal Measures, Part VI., Ferns," by Prof. W. C. Williamson,—"On the Motions of some of the Nebulæ towards or from the Earth," by Mr. W. Huggins,—and "On the Annual Variation of the Magnetic Declinations," by Mr. J. A. Broun.

ROYAL SOCIETY OF LITERATURE.

Feb. 25th.—Sir P. de Colquhoun, V.P., in the chair.—A paper was read, contributed by M. Ferdinand de Bompois, "On an Unique Coin of the Town of Ichnae, in Macedonia," in which he gave an interesting and learned account of this remarkable piece of the early part of the fifth century B.C., and suggested a new arrangement of the coins of that part of Northern Greece.

March 25th.—J. W. Bone, Esq., in the chair—Dr. G. W. Leitner gave an account of the tribes inhabiting Dardistan, between Kashmir and Badakhshan, with specimens of the fables, songs, proverbs, &c., still current among a race but little known to European travellers. He also called attention to a collection of antiquities and objects of industry made by him chiefly in the north of the Panjab, and which he considered to exhibit many traces of the influences of Greek Art on the treatment of the human physiognomy.

ROYAL INSTITUTION.

April 6th.—Warren De La Rue, Esq, V.P., in the chair.—Miss Brandreth, Messrs. F. A. Bosanquet, E. Brandreth, R. B. Lawes, R. Nicol, W. W. Portal, E. L. Walker, and J. W. A. Woodroffe, were elected members.

INSTITUTION OF CIVIL ENGINEERS.

March 31st.—T. E. Harrison, Esq., President, in the chair.—The President stated that Capt. Tyler had asked to be allowed to withdraw his paper "On the Working of Railways," and that that request had been complied with.—The paper read was "On the Fixed Signals of Railways," by Mr. R. C. Rapier.

ANTHROPOLOGICAL INSTITUTE.

Feb. 24th.—Sir D. Gibbs in the chair. Mr. B. Lloyd read a paper "On the Beothucs, a tribe of Red Indians, supposed to be extinct, which formerly inhabited Newfoundland." The author, after reviewing the various accounts related of the Aborigines of the island from the time of Sebastian Cabot downwards, gave the results of the information he picked up from various sources during an exploratory cruise he made last summer round the coast of Newfoundland, respecting the tribe of Indians which inhabited the island up to a period which terminated about forty years ago, when, by reason of the cruelties practised on them by the English fishermen, and the warfare carried on against them by the Micmac Indians, they were reduced in number, and finally the few of them that were left, it is thought, crossed over the Straits of Belleisle, or at all events disappeared. Mr. Lloyd also read "Notes on Indian Remains found on the coast of Labrador." The Indian remains found on the coast of Labrador consisted of rudely constructed buildings of stone slabs, which were discovered on the sea shore at the western entrance of the Straits of Belleisle. They were described to the author as Indian graves, but there was no evidence to show that such was the use to which they had been applied. On the contrary, it seemed probable they were stone wigwams, built by some Indian families for a summer residence. The author was fortunate enough to discover, at L'Anse du Diable, which is a cave situated about twenty miles east of the locality where the so-called Indian graves were found, a few arrow-heads of quartzite and hyaline quartz, on a sandy "barren," which stretched inland from the head of the cave. From circumstances connected with the cave, the author concluded that the locality had been chosen by some unknown tribe of Indians for the manufacture of their arrow-heads during an occupancy of some considerable time on the spot. A paper was read, by Dr. S. Holden, "On a peculiar Neolithic Implement from Antrim."

March 24th.—Prof. G. Busk, President, in the chair.—The President exhibited and described an Ashantee skull. The specimen, with other bones of the body, was taken by Surgeon-Major Gore from an outlying camp which had been deserted on the approach of the British troops. It presented the characteristics rather of a female than a male skull, but Surgeon-Major Gore affirmed that he had never heard of the Ashantees carrying about the bones of a woman. If the skull exhibited belonged to a man, he could not have been a military leader, but he might have had such a rank in his tribe as entitled him to the honours that were evidently bestowed on his remains. The paper gave full description and detailed measurements. A paper was read by the Rev. Dunbar I. Heath, "On the Origin and Development of the Mental Function in Man."—Mr. W. L. Distant read a paper "On the Mental Differences between the Sexes." The question discussed in the paper was, is there clearly proved to be a mental difference between the sexes, and is that difference one of kind or only of degree? Authorities were quoted to show the undoubted physical differences, such as weight of brain, form of skull, &c.; also the now moderately well-established fact that in primitive races the hair of women approximates more closely to that of man than obtains in a higher state of civilization. But, it having been clearly proved that the advance of man is shown by a higher form of skull and increase of the cranial capacity, an attempt was made to show some of the conditions that had retarded women in the mental struggle. The result seemed to prove that the mental divergences might be greatly accounted for, 1, by sexual selection, difference of education, and force of custom; 2, by physiological conditions,—and that, as the race progresses, the cranial capacity of the sexes, though not becoming identical, which is a physiological impossibility, will yet become much less distinct and divergent, which is a moral certainty if based on moral conclusions.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

TUESDAY, APRIL 7TH, 1874.—Dr. Birch, F.S.A., President, in the chair.—The following candidates were duly elected members of the society:—Percy Read, J. Winter Jones, Jonathan Peckover, and Henry Danby Seymour. The following papers were then read:—1. "On Four Songs contained in an Egyptian Papyrus in the British Museum." Translated with notes by C. W. Goodwin, M.A.—Of these four songs three partook of the same nature, and were amatory compositions, written in a highly imaginative and poetical style, with much voluptuousness of expression, having a very striking resemblance extending throughout whole passages to the language of the Canticles. Structurally the verses possess both rhythm and alliterative construction, with regular pauses or strophes. The first song is unfortunately in a very fragmentary condition, and is besides imperfect at the beginning and the end. In the second song these marked parallelisms occur, "The beginning of the song of joy and beauty of thy sister beloved of thy heart." "Come to the meadows my brother beloved of my heart;" "Sister, one of the lilies;" and further on, "The voice of the swallow resounds, it saith the earth is enlightened;" "Let thy hand be in my hand when I go to walk, let me be with thee in every pleasant place;" "Thou lovest me running to seek me." Nearly similar passages occur in the third song, which is also a fragment. The fourth song or hymn is of a very different nature, and is evidently one of the solemn dirges used at festivals during the exhibition of the figures of Osiris, as related by Herodotus. This hymn is in the text ascribed to King Antuf, a monarch of the XIth dynasty. The ancient relic is fortunately almost perfect, and the composition is of a high order, as the following extract will testify:—"Put oils upon thy head, clothe thyself with fine linen adorned with precious metals, with the gifts of God. Multiply thy good things, yield to thy desire, fulfil thy desire with thy good things, whilst thou art upon earth, according to the dictation of thy heart. The day will come to thee when one hears not the voice, when the one who is at rest hears not the voices of the mourners" . . . "yea, behold none who go thither returns back again." 2. "Nimrod et les Ecritures Cuneiformes." Par Joseph Grival (read in English).—In this essay the author maintained that Merodach, under his Accadian name of "Amarud, the eldest son of the Lord of Urhi" was identical with Nimrod, the "géant chasseur" of the Septuagint

GEOLOGICAL SOCIETY.

MARCH 25TH.—J. Evans, President, Esq., in the chair.—Messrs. W. J. Lancaster, T. Parry, and H. Wilson, were elected Fellows; and Professors W. P. Schimper and I. Cocchi, Foreign Correspondents of the Society. The following communications were read:—"On the Upper Coal-Formation of Eastern Nova Scotia and Prince Edward Island, in its relation to the Permian," by Principal Dawson; "Note on the Carboniferous Conglomerates of the Eastern Part of the Basin of the Eden," by Mr. J. G. Goodchild; "An Account of a Well-Section in the Chalk at the North End of Driffield, East Yorkshire," by Mr. R. Mortimer; and "On Slickensides or Rock-Striations, particularly those of the Chalk," by Dr. O. Ward.

LINNEAN SOCIETY.

APRIL 2ND.—J. G. Jeffreys, Esq., in the chair.—Mr. J. H. Mangles was elected a Fellow. The following paper was read:—"On the Morphology of the Skull in Woodpeckers (Picidæ) and Wrynecks (Yungidæ)," by Mr. W. K. Parker.

CHEMICAL SOCIETY.

APRIL 2ND.—Professor Odling in the chair.—Papers "On Sulphocyanide of Ammonium and Sulphocyanogen," by Dr. T. L. Phipson, and a "Note on a Reaction of Gallic Acid," by Mr. H. R. Procter, were read by the Secretary. Mr. Procter finds that a mixture of gallic acid and potassium arsenate when exposed to the air acquires a beautiful green colour. Mr. W. N. Hartley then read a memoir "On Cobalt Bromides and Iodides," in which he described the method of preparation and properties of these compounds. They closely resemble the corresponding chlorides. Fine specimens of the different salts were exhibited by the author. Mr. E. Neison read a paper "On the Distillation of Sodium Ricinoleate," and Mr. C. H. Piesse a "Note on the Solubility of Plumbic Chloride in Glycerine." Mr. Kingzett had a communication "On Ozone as a Concomitant of the Oxidation of the Essential Oils, Part I.," and from his experiments he infers that the compound produced during the oxidation of oil of turpentine is neither ozone nor hydrogen peroxide, but a hydrated oxide of turpentine. The last paper was "On the Action of Chloride of Benzyl on Camphor, Part II.," by Dr. D. Tommasi.

ASTRONOMICAL SOCIETY.

APRIL 10TH.—Prof. Adams, President, in the chair. Mr. De La Rue gave a verbal description of a piece of apparatus which he had devised for carrying out M. Janssen's method of photographing Venus near to ingress and egress upon the Sun's disc. The instrument is intended to be attached to the photo heliographs, and weighs less than eleven pounds, inclusive of a small driving-clock, which carries a revolving plate of about ten inches in diameter, on which small photographs of Venus and the Sun's limb are to be taken. Lord Lindsay described the form of instrument which he had devised for the same purpose: it appeared to be very similar to that described by Mr. De La Rue, except that it is mounted on a separate pillar from the telescope, in order to avoid tremors. Lord Lindsay also read a paper "On a Method of Determining the Solar Parallax from Observations to be made at the next Opposition of Juno, which occurs in November of this Year." He proposes, while in the Mauritius, to make a series of heliometric measures of the distance of Juno from the nearest fixed stars; and, by comparisons of the measures taken soon after Juno has risen above the eastern horizon with those taken before it sets at the western, to determine the terrestrial parallax. By this method he will be able to make his measures during all the clear nights of the month, or six weeks before and after Opposition; and although the Parallax will be considerably less than in the case of Venus, he considered that he had reason to hope that the probable error of the result would, owing to the number of the measurements, and the ease of dealing with points of light instead of discs, be less than either in the case of the Transit of Venus or the Opposition of Mars.

MATHEMATICAL SOCIETY.

APRIL 9TH.—Prof. Cayley, V.P., in the chair.—Mr. J. Hammond was proposed for election; the Rev. Prof. Townsend was admitted into the Society; and Prof. C. Niven and Mr. T. Muir were elected Members.—The following communications were made: "On the Probable Error in Statistics," and "The Combination of Statistics," by Mr. G. H. Darwin,—"The Determination of the Form of the Dome of Uniform Stress," by Mr. C. W. Merrifield. Mr. A. J. Ellis gave an explanation of this theory that ordinary (commutative) algebra is the calculus of similar triangles upon one plane. Prof. H. J. Smith spoke upon the higher singularities of plane curves. A paper by Mr. H. M. Taylor, "On Inversion, with Special Reference to the Inversion of an Anchor-Ring," was taken as read.

MICROSCOPICAL SOCIETY.

APRIL 1ST.—F. H. Wenham, Esq., V.P., in the chair. A list of donations was read, and Mr. R. Horne was elected a Fellow. A paper "On the Structure of the Lepisma Scale," by Dr. Anthony, was read, in which the author showed that the two sets of markings were upon opposite sides of the scale, the ribs being upon the under side. The paper was illustrated by drawings, and led to a discussion, in which Mr. M'Intire Mr. Slack, and the Chairman took part Mr. Wenham gave a demonstration of his method of measuring the angular apertures of objectives, and explained his mode of stopping out the extraneous rays which were so frequently a cause of error. The subject created some interest, and the means and importance of stopping out false light were discussed by Messrs. Ingpen, Slack, Stephenson, and Wenham. Mr. S. J. M'Intire read a short paper describing the proboscis of a moth (believed to be a South African species) which was furnished with a means of perforating the nectaries of flowers. A mounted specimen was exhibited under a microscope in the room, and drawings in illustration of the paper were placed upon the table. Further remarks upon the subject were made by Mr. C. Stewart and Mr. Wenham.

GEOGRAPHICAL SOCIETY.

APRIL 13TH.—Right Hon. Sir H. Bartle Frere, K.C.B., in the chair. The papers read were—"Majwara's Account of the Last Journey and Death of Dr. Livingstone," by Mr. F. Holmwood,—and "Journey through Kuldja and Russian Turkestan, with Remarks on the Hydrography of that Region," by Mr. Ashton W. Dilke.

The French Minister of Agriculture and Commerce announced at a late meeting of the Assemblée that it was proposed to give M. Pasteur a pension of 12,000 francs, for the eminent services he has rendered to science.

The "Composition and Culture of Tobacco" is the title of the report made by Mr. S. W. Johnson to the Connecticut Board of Agriculture. The chemical examination of New England and Kentucky tobacco is of considerable interest, and the statement of the rate of exhaustion of the soil by its growth, which is now shown not to be very great, is valuable.

MANCHESTER EXHIBITION OF APPLIANCES FOR THE ECONOMICAL CONSUMPTION OF FUEL.

Our second visit to this exhibition confirmed the opinion expressed in the preliminary notice last month, namely, that a decided step has been taken towards the solution of the great coal question; and, although many advanced minds may feel disappointed that something far more extensive was not attempted, yet the public of the cotton metropolis have reason to congratulate themselves that so much has really been accomplished.

It is by no means our intention to notice in this report everything which is exhibited, as neither space nor time for such an exhaustive method of procedure are at our disposal. We purpose to record those things which—during several careful perambulations round the building, coupled with frequent opportunities of hearing explanations of the various exhibits from the attendants—we have come to consider of the greatest importance, and most worthy of notice. At the same time, we would wish to observe that our silence upon a great mass of exhibits must not be construed into either condemnation or praise, but that a variety of causes have combined to keep them in the background.

Upon first entering the building, a great show of "economisers" arrested the attention; the principal of which are Green's, Twibil's, Neild's, and Bell's. The two former have been long before the public, and are well known. They are formed of a series of vertical pipes, through which the water circulates, and are fitted with reciprocating scrapers, worked by suitable mechanism, for preventing any accumulation of carbon from the heated gasses, which pass by them on their way to the chimney. The arrangement of tubes is very similar in both cases, the principal difference seeming to be in the form of the scraper and mechanism. In the method shown by Neild, the tubes are constructed in the form of rings, one above another, with upright connecting pipes; the scrapers in this case being a continuous circular motion. In Bell's apparatus, the tubes take a spiral form, the scrapers travelling round and round the same until the top of the spiral is reached, when, by reversing gear, they are caused to descend.

Both these methods have the advantage of a great reduction in first cost of apparatus, and would appear to do the work required very effectively. The one has the advantage of a simple and continuous motion in its mechanism, but the other has excellent facilities for circulation, which probably more than compensates for the slightly increased complication.

In passing along we arrived at Hurd and Simpson's coal getter, which has the appearance of a substantial and really practical machine. Mather and Platt, of Salford, came next, really a splendid show; the most attractive part of which being their underground hauling engine. The workmanship shown by this firm being, as might be expected, very fine indeed, and reflecting credit upon the locality. Mechanical stokers exhibited by Mr. Dillwyn Smith and Mr. W. Young, both we found to be creditable attempts in this direction. The annexé for household grates here came into view, and it is in this portion of the exhibition where we saw much interest displayed by the fair sex. Amongst noteworthy exhibits in this department, a range by Newton and Chambers, of Sheffield, must be named; several ranges shown by Shillito and Shoreland, Elliott, Alston and Co., and Fallows and Bates; a curious arrangement called the "vacuum draft," invented by a clergyman; also a good specimen of grate by Leech Brothers. Perhaps Wadsworth's "Metropolitan fire" must be ranked as the most original exhibit in this department, which, if improved in appearance or design would be exceedingly well adapted to the needs of the metropolis. Strange as it may appear, the fire space in this arrangement is only 8 inches by 5 inches by 5 inches, from which the amount of heat contrived to be radiated is really surprising. A very good kitchen range is found next to this, viz., the "Universal," by Sanderson and Proctor, of Huddersfield. Gas stoves so familiar to us all at this day were also shown in great variety; but the only thing that seemed practicable and noticeable was Wallace's arrangement of gas-heating apparatus. Upon leaving this locality, we seemed to enter a perfect wilderness of odds and ends, such as fire bars of all imaginable shapes and forms, both moveable and stationary; peat machinery; coating for steam pipes; and a number of other things, some few of which it requires a little thought to connect with economy of fuel. But, as we progressed, steam boilers or generators themselves came into view, in which the greatest economy of the future must be looked for. Under this head we must first notice a splendid boiler, in point of workmanship and finish, by Galloway and Son, constructed on their well-known system. Also a very good boiler of the usual type by Clayton and Son, of Preston, driving the machinery in the exhibition. But from the attention paid by frequenters of this and other exhibitions, and the interest displayed by engineers generally in sectional boilers, it would appear that it is from amongst this class that the boiler of the future will be found. Of these, Root's, Griffith's, and Shepherd's seem to claim the most attention. Now, with regard to the latter, the Manchester Sectional Boiler Company, who are the proprietary, we found a working boiler on exhibition at another part of the town under steam. We may say that when we attended this supplemental exhibition, we saw the boiler under a pressure of 107 lbs. to the square inch, and certainly doing some very extraordinary evaporative duty, and far in excess of what we had previously seen accomplished with any form of steam boiler whatsoever. The same company show a very simple and ingenious apparatus for extracting water from steam (also the invention of Mr. Shepherd), which seems to be very generally coming into use, and must assuredly be of great service where trouble arises from priming.

Passing on, a gas engine came in view, shown by Crossley Brothers, of Manchester, which should be useful to printers and others requiring little power. Near to this is a model of Robey and Co.'s patent oven for pottery ware, which seems to be economical in the use of its fuel. Near to the door we noticed Oswald Rose's piston, Hallam's safety valve, and Gifford's injector, which speak sufficiently for themselves.

One model, apparently little noticed, seemed to us to be of immense importance; Clott's ventilation of sewers. We believe this plan is actually at work, with the most beneficial results, at a place near to Halifax, in Yorkshire, and that it clears the sewers there of all obnoxious gases, as well as utilizing the same as fuel. This is a matter that our corporate bodies throughout the country should enquire into, as it would seem that the means of purifying the drainage of the whole nation are here at hand, and of a very simple and cheap character.

We understand the Exhibition was to close on the 12th of April; but we trust the good example which has here been set will be imitated by all our large centres of industry throughout the kingdom, as if this is done even to a limited extent, we are inclined to think the great coal problem will be rapidly in a fair way for solution.

We have again to record our thanks to Mr. W. Gadd, C.E., Manchester, for enabling us to present our readers with this report on the important and practical Exhibition there.

MACHINERY WITHOUT LUBRICATION.

Our contemporary, the *Mining Journal*, calls attention to a recent invention, having for its object the dispensing entirely with the use of lubricants in all classes of machines, which is now on its trial with every prospect of success. The value of such an invention cannot be over estimated when the resulting cleanliness, saving of the cost of lubricants, and of time and attention in oiling bearings is considered. For the ordinary metal bearings are substituted others of a peculiar composition, less than half the cost of metal, but which can be turned, bored, and is otherwise susceptible of treatment similar to metal. In consequence of the inventor, Mr. S. Cohné, being an exhibitor at the International Exposition at Vienna, and from that cause then resident there, the first experimental bearing of this composition was tried at the machine works of Messrs. Dolainski, of Vienna. It was placed in position on August 24th last; and recent intelligence from that city confirms that this bearing, which has been in constant use from that date without any lubricant, is still in admirable working order, the shaft running "coolly, smoothly, and continuously." In this country a bearing placed in position at Messrs. Waterlow and Sons' Works, London Wall, on February 16, is at this time in perfect order, the shaft being bright and smooth, and no grease nor oil having been used. This is on the driving shaft, near to it is taken the motion for driving two large printing machines, and several other machines are driven by the same shaft. As a proof of its working satisfactorily, another bearing is now placed on the steam-engine at the same works. These bearings are now in use at the Bessemer Steel Works, Greenwich; at Messrs. Simons Brothers, engineers, Southwark; the Dartford Gunpowder Mills; Mr. Starnes' Engineering Works, Ratcliffe; at the works of Messrs. Virtue, City-road; and the London Cotton Mills, Bermondsey, besides other places, and are being tried on the axle boxes of the South Western and Midland Railways with every prospect of success. The test at the Bessemer Works has been a severe one, it being a rail cutting mill upon which the bearings are placed, the shaft running at the rate of 1,400 revolutions per minute. Those at Messrs. Symons Brothers are upon a very heavy grindstone, where they are subject not only to very great strain, but also to the flying in of the grit from the stone, yet, as in all the other cases they are working well. M. Cohné has lately visited Manchester, and is now engaged in making bearings for the numerous machines employed in the manufacture of the textile fabrics in that quarter. A recent estimate places the number of spindles in these machines in Great Britain at 36,000,000. Here, then, alone is an immense field for Mr. Cohné to labour in, and an almost incalculable saving to be effected, for let it be borne in mind that dispensing with the lubricant in these machines means not only economy in that way, but the saving of a large quantity of material now damaged by contact with the oil. The spindles in these machines run at a very high speed, but the new bearings are equal to the requirements, for at the experiments carried out by Mr. F. C. Smith, engineer, Grantley Works, Peckham, some were successfully tested up to 9,000 revolutions per minute. They are now in use in Manchester and Oldham, and are giving great satisfaction.

Should Mr. Cohné's invention realise the expectations reasonably formed from its applications thus far, the liability to accidents will be greatly lessened; for it is well known that these frequently occur in oiling bearings. Another source of consolation will be that these new bearings are not likely to find purchasers at the old metal shops, to which their more attractive looking rivals now frequently gravitate. The thanks of those that "go down to the sea in (steam) ships" will also be gratefully rendered to the inventor, for who has not felt nausea from those most gross and fatty smells from the engine room.

As to the comparative durability of these bearings with the metal ones, it should be stated that the first bearing at Vienna, now nearly nine months in use, does not exhibit any signs of wear or deterioration.

PATENT LAW REFORM.

SPECIAL NOTICE TO MEMBERS OF THE INVENTORS' INSTITUTE.

As the upholding and improvement of our Patent Laws form one principal work of the Inventors' Institute, it is desirable to call your attention to its two next meetings, viz., on 19th March and 2nd April, as these are to be conferences of the council and members on the Patent Laws. The advent of a new Government and a new Parliament makes the present time one that may, under all circumstances of the case, be fairly considered a crisis for the Patent Law question; hence it seems very desirable that these conferences should afford full and decided expression of the views of the whole body of members on the important subject referred to, so that the Council may find itself better prepared for immediate action of a satisfactory character. This will be best effected by your attending the meetings above-mentioned (or one of them), and stating your views thereat; but, if that should be inconvenient, it will be quite open to you to communicate your views in writing to the Council; and in doing so it would be well if you would refer to the following summary of the propositions the Inventors' Institute have already put forward (see the proposed Inventors' Right Bill published in the Institute's journal — the SCIENTIFIC REVIEW—for July, 1871, and abstract thereof published in the same journal—SCIENTIFIC AND LITERARY REVIEW—for September, 1872, and the articles No. 1 and 2 on "Revision of Parliamentary Report on Patents," in January and February in the present year).

The points above referred to are :—

1. A large reduction in the cost of Letters Patent (one-half has been suggested).
2. Amendment of the procedure for obtaining Patents.
3. General reform of the Patent Office and Patent Museum arrangements.
4. Amendment of the legal procedure for repression of Infringements, and of unwarrantable assumption of Patent Rights, so as to render the same more certain and far less costly.

Each member will greatly facilitate the object in view if only he will kindly communicate his views as to what importance he attaches to these points, and what he considers to be the relative value of each point, *i.e.*, whether the first or any other is more pressing for amendment than the others, &c.

The meetings for members commence at 8 o'clock p.m.

F. W. CAMPIN, Secretary.

Inventors' Institute, 4, St. Martin's Place,
Trafalgar-square, 14th March, 1874.

P.S.—The remaining meetings for this session are on Thursdays, March 19th, April 2nd, 16th, 30th, May (Annual General at 4 o'clock, afternoon) 14th, May 28th, June 11th.

For the subjects other than above to be considered at these meetings, see the Monthly Notices in the SCIENTIFIC ADN LITERARY REVIEW.

Attendance of members and friends is requested.

⁂ As the Secretary of the Inventors' Institute fears that every Member has not received the above notice, we insert it at his request.—[Ed. S. & L. R.]

PATENT LOGOTYPES.

Patent logotypes consist of (1), words, syllables, or two or more letters cast in one piece; (2), figures cast in various combinations; and (3), words, syllables, and letters having the characters sunk into the foot of the type.

It has been demonstrated that by a judicious use of syllables and words, cast in one piece instead of in single letters, a saving of more than one hundred per cent. is effected, monotonous toil abridged, and correctness in the work of the compositor brought to a much higher point than under the ordinary system.

Suppose a compositor has to put together the following sentence: "The question before us is therefore reduced to very narrow limits." The mode as practised at present would involve 55 lifts for the letters and nine for the spaces which divide each word, making a whole of 64 lifts. With the patent logotypes there would be but 25 lifts—"The que-s-tion be-fo-re us is the-re-fo-re re-du-ced to ve-ry na-rr ow li-mi-ts."

With logotypes a compositor can, after three months' practice, set up 4,000 letters in an hour; under the ordinary system men who have worked at it for twenty years very rarely attain to 2,000 per hour.

Boys of ordinary intelligence can with six weeks' training put together between two and three thousand letters per hour. The objection that such a large number of combinations must require exceptional powers of memory is met by the fact that, in the experiments made with lads of about 14 years of age, a week's practice has been sufficient to give the learner a tolerably accurate notion of the position of the types, while with a fortnight's training he has been capable of going unerringly and without hesitation to the proper compartment.

The advantages of legible types and logotypes are that very little special training is necessary to make a proficient compositor. Being in consonance with the laws of optics, the character is palpable to the eye, and the task of correcting, so notoriously irksome even to professional compositors, can be easily performed without a proof-sheet, and by the merest tyro.

The introduction of the new system would assist in the solution of one of our great social questions: women and girls could be trained into skilled compositors in a very short time.

In conclusion, the attention of those more immediately connected with the printing trade is drawn to the following facts: Very few compositors can at present set up 2,000 letters per hour: with logotypes an ordinary hand will have no difficulty in composing 4,000; and the probability is that constant practice will greatly add to his celerity.

This invention is exhibited by Colonel Tomline at the International Exhibition, South Kensington.

CRYSTAL PALACE SCHOOL OF PRACTICAL ENGINEERING.

THE distribution of certificates of merit to the students who have successfully passed the examinations in this school took place on the 25th ult. in the Lecture-room, in the South Tower of the Palace, in the presence of a considerable number of the parents and friends of the students. In the floor above the lecture room were a number of finished drawings, which had been executed by the students during the term, and the surveys of a complete imaginary railway and docks in the grounds of the Palace. There were also exhibited some castings of parts of engines, and in the fitting shop there was a steam engine of three-horse power which had been planned, built, and finished entirely by the students, and which it was stated, was already sold. Mr. C. W. Siemens, D.C.L., F.R.S., member of the Council of the Inventors' Institute, gave away the certificates, and, in the course of a prefatory address, said, though this school had been established but a short time, it had already brought forth fruit of no mean character. He was glad to see, in going through the workshops of the establishment, that the students not only comprehended the principles on which construction should be based, but had actually mastered those practical details which led up to practical and useful performance. Mr. Shenton, the superintendent, read the report of the examiners, and the certificates were distributed—those who obtained the highest number of marks being:—For lecture question on steam, Mr W. Michels; for the best work in the drawing office, Mr. L. K. Kinder; for the best work in the pattern shop, Mr. C. Gree; and for the best work in the fitting-shop, Mr. W. Michels.

APPLICATIONS FOR LETTERS PATENT.

(*Continued from page 62*)

On January 23rd.—284 to 305.—P. P. F. Michaé. Production of tannin and canocarpine.—T. Pakenham. Singeing pigs by the application of gas.—T. Walker. Utilising the waste heat of steam engines.—A. Lacaze. Weaving loom (com.)—W. Sellers. Sewing machines.—P. E. Lockwood. Method of treating beer, ale, porter, and other beverages.—A. M. Clark. Apparatus for propelling vessels (com.)—F. J. Noble. Ratchet braces.—A. M. Clark. Mechanical toy (com.)—T. Walker. Means of transmitting electric currents for telegraphic and other purposes.—J. Saxby. Railway points and signals.—F. Rath. Plaited. creased, or folded fabrics.—F. J. King. Treatment and separation of ores and mineral products.—J. M. Smith. Medicinal compound, and plaster made therewith (com).—L. Finger. Electro-magnetic annunciators. (Complete specification.)—S. C. Lister. Preparing and combing waste silk and wool or hair.—G. G. Rew. Syphons—E. H. Hache. Mechanical apparatus for indicating by clock-work the excessive pressure of lighting gas (com.)—S. L. Delalot. White metal, to be termed "metal delalot."—W. Howes and W. Burley. Carriage lamps.—J. Harris. Sewing machines.—J Turney. Apparatus for drying or finishing glue.

On January 24th.—306 to 323.—J. Maynes. Machinery for turning and cutting wood, metal, and other materials.—A. Brown. Dredgers.—J. Imray. Regenerative furnaces (com.)—H. Cockerham. Looms for weaving striped fabrics.—W. H. Harfield. Capstans and windlasses.—W. W. De la Rue and W. T. Shaw. Calenders or date indicators.—J. Gruby. Umbrellas and parasols.—C. Brakell. Looms for weaving velvets and other pile fabrics.—C. M. White. Tobacco pouches.—W. Williams. Hanging and arrangement of window sashes and stiles, and the fixings connected therewith.—F. Condit. Weaving ribbons and other narrow fabrics, and looms and apparatus used in connection therewith (com.)—E. F. R Lucas. Manufacture of anthracene.—I. Chippindale. Apparatus employed for sifting cinders or ashes.—Duke of Sutherland. Implements to be used in cultivating waste or moor land by steam power.—G. H. Chubb and W. H. Chalk. Safes.—F. Gebauer. Rotating hydraulic mangle.—A. M. Clark. Process for eliminating the soluble principles contained in gases and vapours (com.)—A. M. Clark. Drying and heating purposes (com.)

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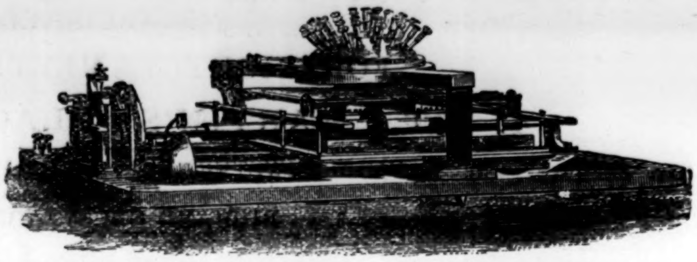

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